Appendices

Appendix 1
Profiles of Under-represented Natural Communities

The following pages contain a profile of each of the 38 natural communities identified as under-represented in the Bay Area gap analysis. Communities are in order of priority as determined by the combined priority score from Table 8.

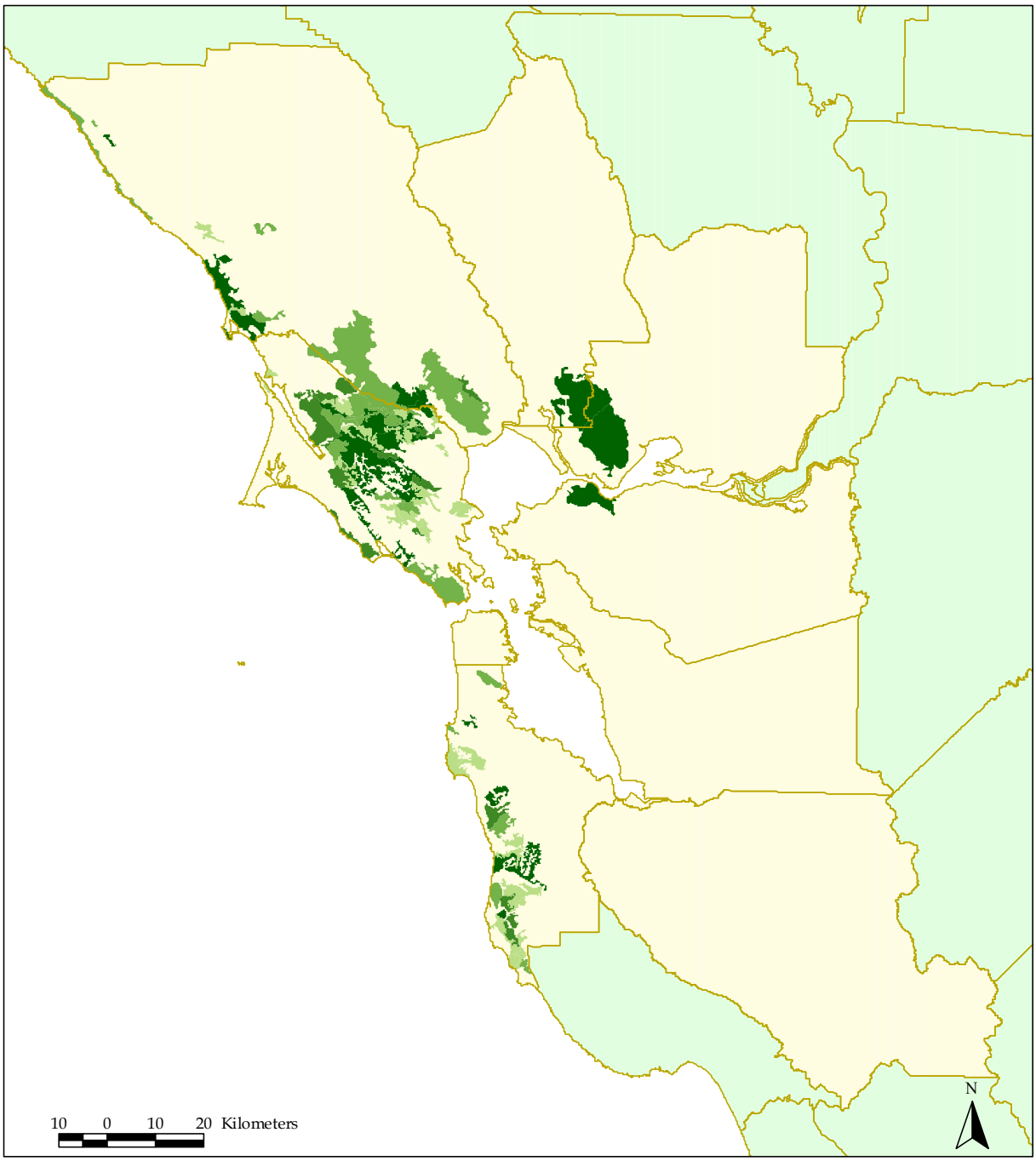
Information from numerous tables in the report and appendices has been summarized in these profiles to make it easy to find information for a particular community.

Along with community statistics, each profile contains a map of the community's Bay Area distribution. Distribution outside the Bay Area is not shown.

COASTAL PRAIRIE

Combined Priority Score:	**10**
Natural Community Code (Holland, 1986)	41000
Km² mapped in California	880.3
Km² mapped in the Bay Area	696.4
Proportion of statewide extent found in the Bay Area	79.1%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	17.7%
Additional area needed to meet protection goal (acres)	141,576.6
Proportion of California extent in protected status	10%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	2

Community Description Source: Adapted from Holland, 1986.	Coastal Prairie consists of two communities. Coastal Terrace Prairie (41100) is a dense, tall grassland (to 1m tall) dominated by both sod and tussock-forming perennial grasses. Most stands are quite patchy and variable in composition, reflecting local differences in available soil moisture capacity. Bald Hills Prairie (41200) occurs in zonal Mixed Evergreen (81100) and North Coast Conifer Forests (82000). SITE FACTORS: Coastal Terrace Prairie is found on sandy loams on marine terraces near the coast (below ~700-1,000 feet) within the zone of coastal fog incursion. Bald Hills Prairie is found on argillic ("self-churning"), fine-textured soils on ridge crests, usually a few miles back from the coast (beyond the limit of coastal fog incursion?). Surrounding zonal forests occur on rockier sites. DISTRIBUTION: Discontinuous from Santa Cruz County north into Oregon.



COASTAL PRAIRIE

Percent Cover

< 30%

30-49%

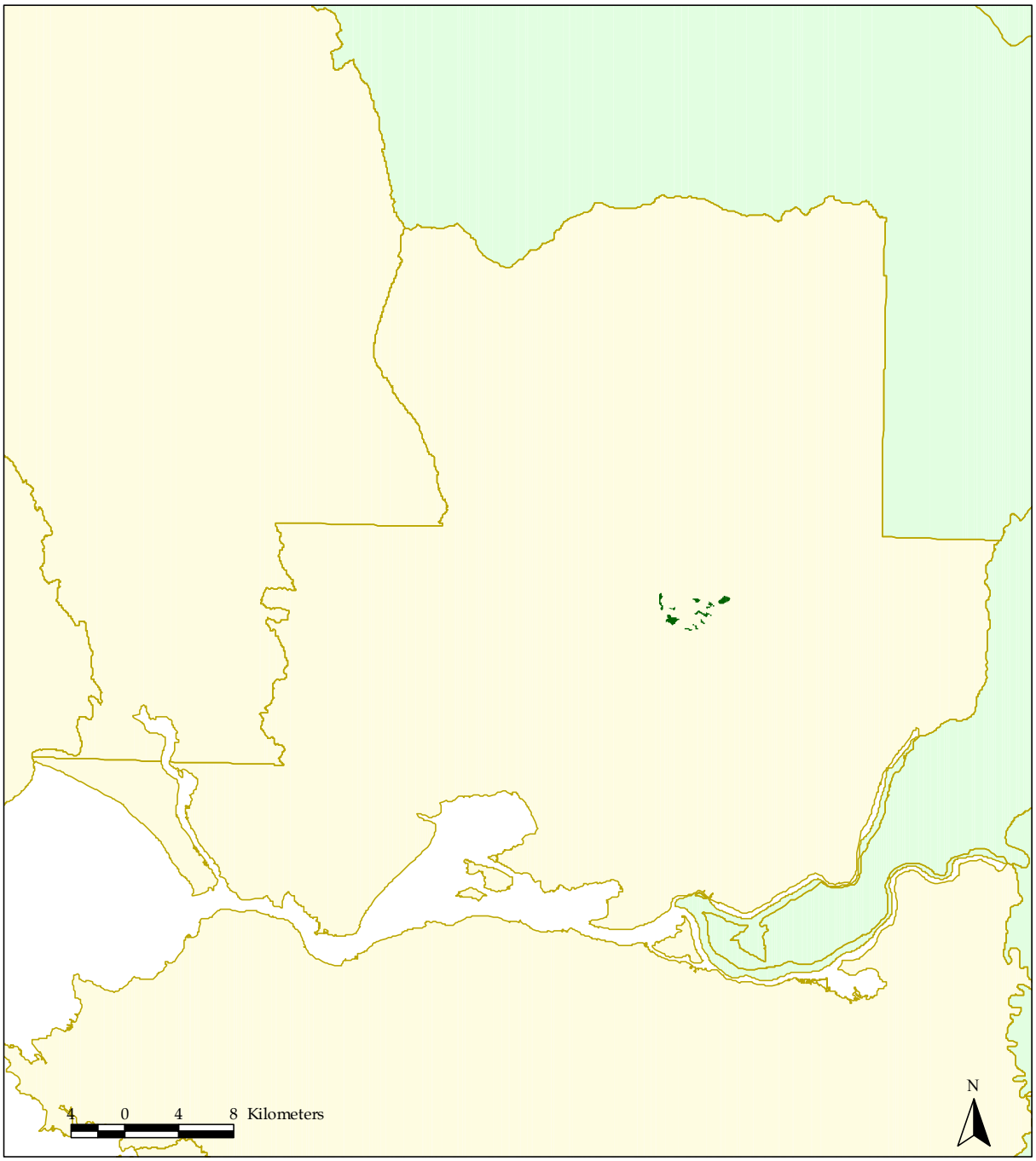
50-69%

> 70%

NORTHERN CLAYPAN VERNAL POOL

Combined Priority Score:	**10**
Natural Community Code (Holland, 1986)	44120
Km^2 mapped in California	1.6
Km^2 mapped in the Bay Area	1.6
Proportion of statewide extent found in the Bay Area	99.1%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	49.9%
Additional area needed to meet protection goal (acres)	196.1
Proportion of California extent in protected status	21.3%
Statewide Status	S1.1 (very rare, very threatened)
Local Development Risk Score	1

Community Description	Similar to Northern Hardpan Vernal Pools (44110), but with lower microrelief, and usually lower overall cover. Pools may be small (a few square meters) or quite large (covering several ha). SITE FACTORS: Fairly old, circum-neutral to alkaline, silicon-cemented hardpan soils. Often more or less saline. Intergrades via Vernal Marsh (52500) with Cismontane Alkali Marsh (52310) which has water present throughout the year. DISTRIBUTION: On lower terraces and basin rims, toward the valley trough compared to Northern Hardpan Vernal Pools; Central San Joaquin Valley north to Glenn and Colusa counties.



NORTHERN CLAYPAN VERNAL POOL

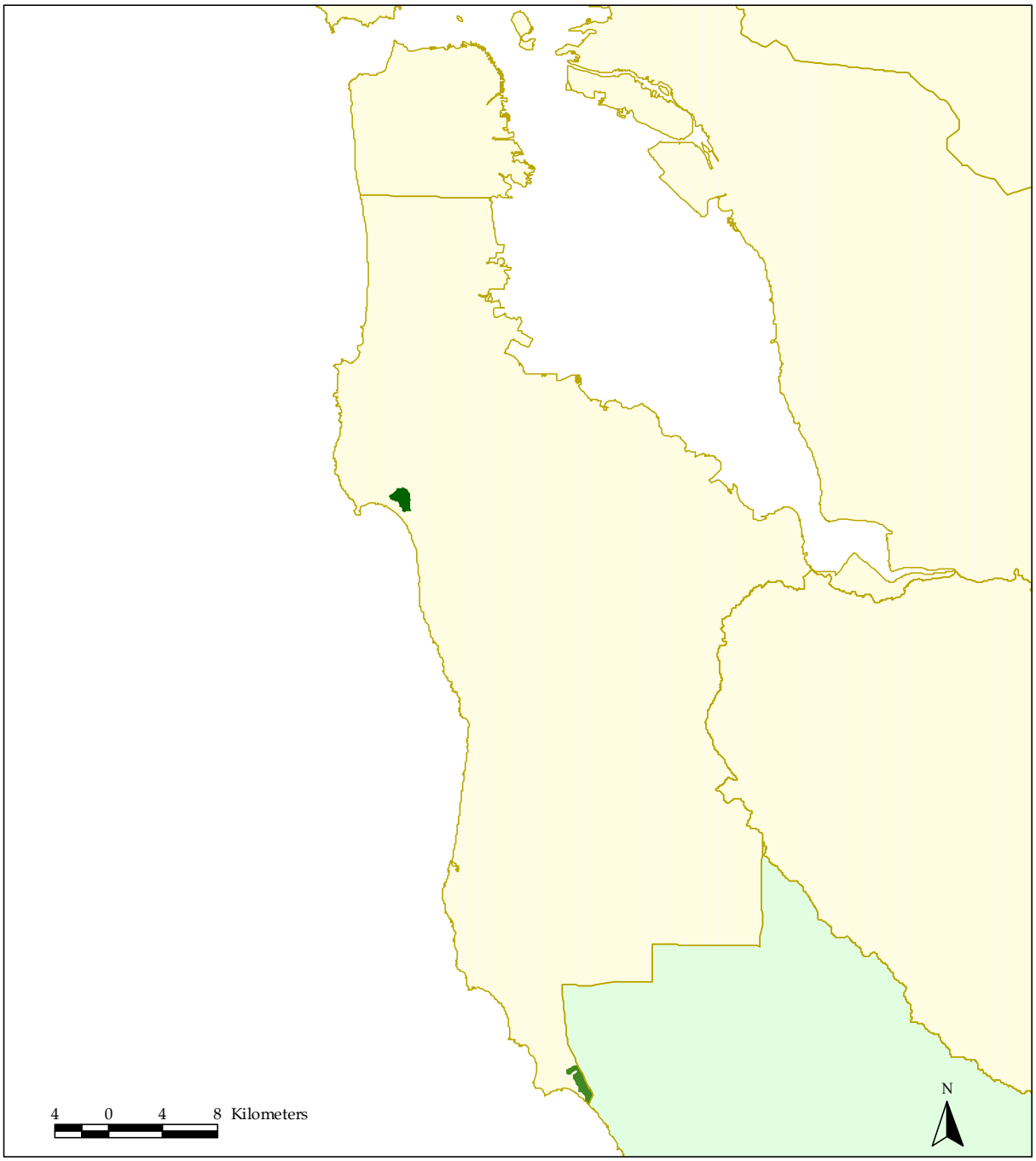
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MONTEREY PINE FOREST

Combined Priority Score:	**10**
Natural Community Code (Holland, 1986)	83130
Km^2 mapped in California	39.2
Km^2 mapped in the Bay Area	3.2
Proportion of statewide extent found in the Bay Area	8.1%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	156.7
Proportion of California extent in protected status	7.5%
Statewide Status	S1.1 (very rare, very threatened)
Local Development Risk Score	3

Community Description Source: Holland, 1986	Somewhat similar to Bishop Pine Forest (83120) but dominated by *Pinus radiata*. Canopies may reach 30m and be 80% Monterey Pine. *Quercus agrifolia* usually is the next most abundant tree. Understories are variable in both composition and density. SITE FACTORS: Limited to well-drained, sandy soils within the limits of summer marine fog incursion. Apparently less fire-prone than other coastal closed-cone conifer types (83000). Intergrades with Upland Redwood Forest (82320) or Knobcone Pine Forest (83210) (Ano Nuevo); Monterey Cypress Forest (83150) and Bishop Pine Forest (83120) (Monterey); Upper Sonoran Mixed Chaparral (37110) (Monterey, Cambria); or Grassland (Ano Nuevo, Monterey, Cambria). DISTRIBUTION: Three natural stands occur in California, the largest in the vicinity of the Monterey Peninsula. The others are near Año Nuevo Point, San Mateo-Santa Cruz counties and Cambria, San Luis Obispo City. Monterey Pine has been planted widely as an ornamental and commercial species.



MONTEREY PINE FOREST

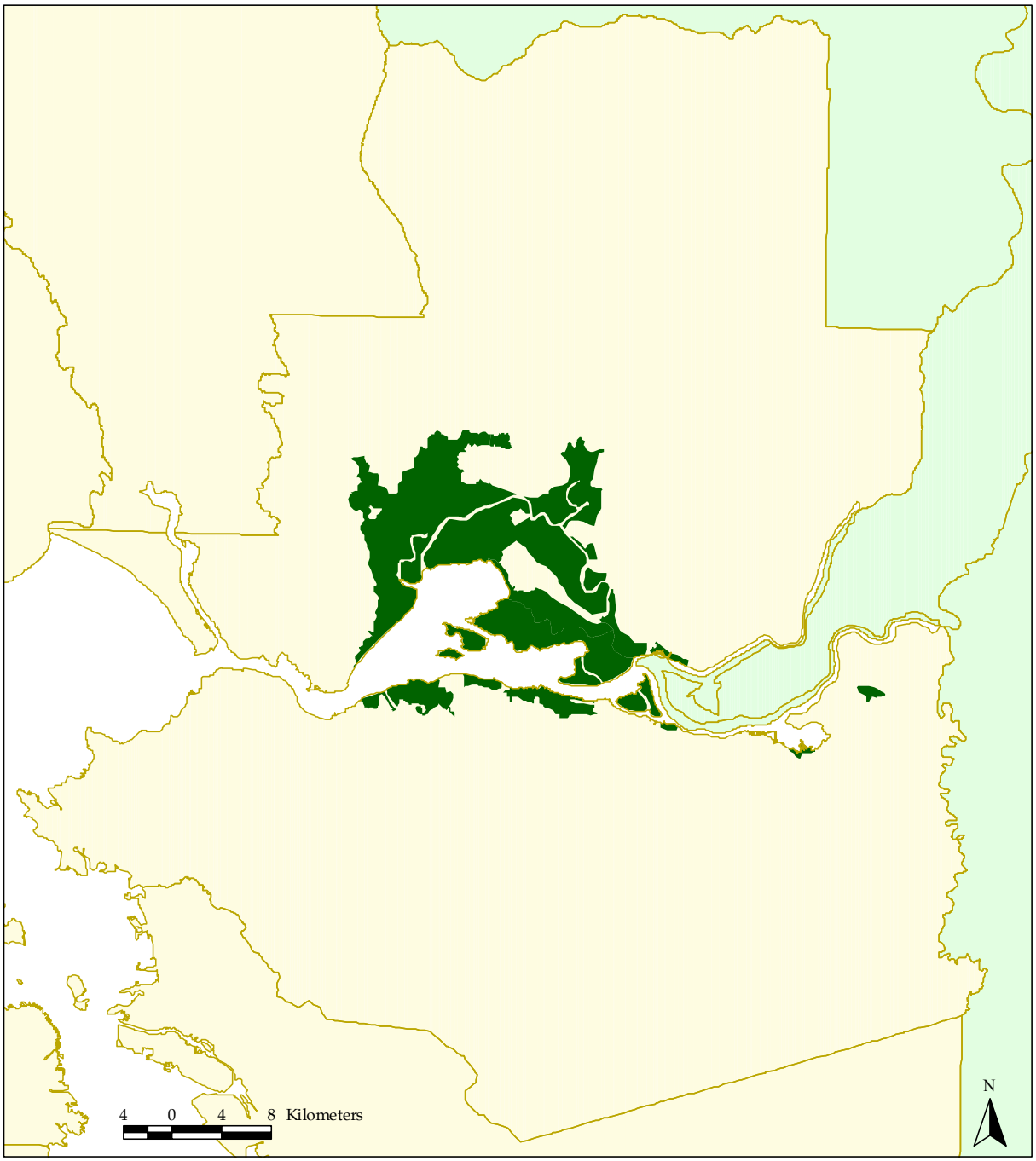
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COASTAL BRACKISH MARSH

Combined Priority Score:	**9**
Natural Community Code (Holland, 1986)	52200
Km^2 mapped in California	310.8
Km^2 mapped in the Bay Area	246.6
Proportion of statewide extent found in the Bay Area	79.3%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	18.7%
Additional area needed to meet protection goal (acres)	49,509.1
Proportion of California extent in protected status	15.7%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	3

Community Description Source: Holland, 1986	Dominated by perennial, emergent, herbaceous monocots to 2m tall. Cover is often complete and dense. Similar to Salt Marshes (52100) and to Freshwater Marshes (52400) with some plants characteristic of each. SITE FACTORS: Similar to Coastal Salt Marshes, but brackish from freshwater input. Salinity may vary considerably, and may increase at high tide or during seasons of low freshwater runoff or both. Usually intergrades with Coastal Salt Marshes toward the ocean and occasionally with Freshwater Marshes at the mouths of rivers, especially in the Sacramento-San Joaquin River Delta. DISTRIBUTION: Usually at the interior edges of coastal bays and estuaries or in coastal lagoons. Adjacent to several Salt Marshes (52100, 52120). Most extensively developed around Suisun Bay at the mouth of the Sacramento-San Joaquin Delta.



COASTAL BRACKISH MARSH

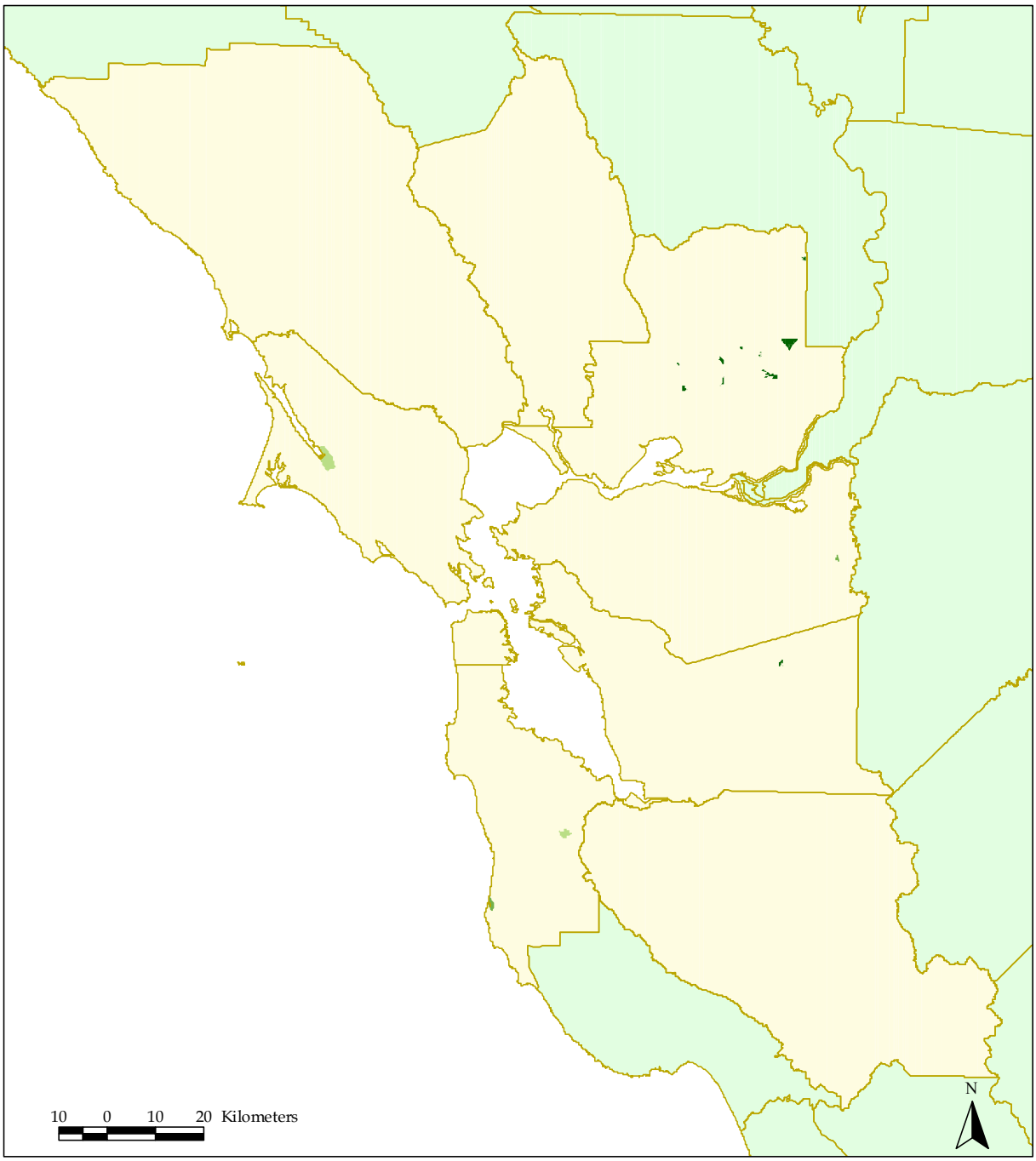
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COASTAL AND VALLEY FRESHWATER MARSH

Combined Priority Score:	**9**
Natural Community Code (Holland, 1986)	52410
Km² mapped in California	501.3
Km² mapped in the Bay Area	13.9
Proportion of statewide extent found in the Bay Area	2.8%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	21.1%
Additional area needed to meet protection goal (acres)	2,715.7
Proportion of California extent in protected status	38.5%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	3

Community Description Source: Holland, 1986	Dominated by perennial, emergent monocots to 4-5m tall. Often forming completely closed canopies. *Scirpus* and *Typha* dominated types and their environmental and floristic distinctions require clarification. SITE FACTORS: Quiet sites (lacking significant current) permanently flooded by fresh water (rather than brackish, alkaline, or variable). Prolonged saturation permits accumulation of deep, peaty soils. DISTRIBUTION: Occasional along the coast and in coastal valleys near river mouths and around the margins of lakes and springs. Most extensive in the upper portion of the Sacramento-San Joaquin River Delta. Common in the Sacramento and San Joaquin Valleys in river oxbows and other areas on the flood plain. Occasional along the Colorado River on the California-Arizona border. Now much reduced in area through its entire range.



COASTAL AND VALLEY FRESHWATER MARSH

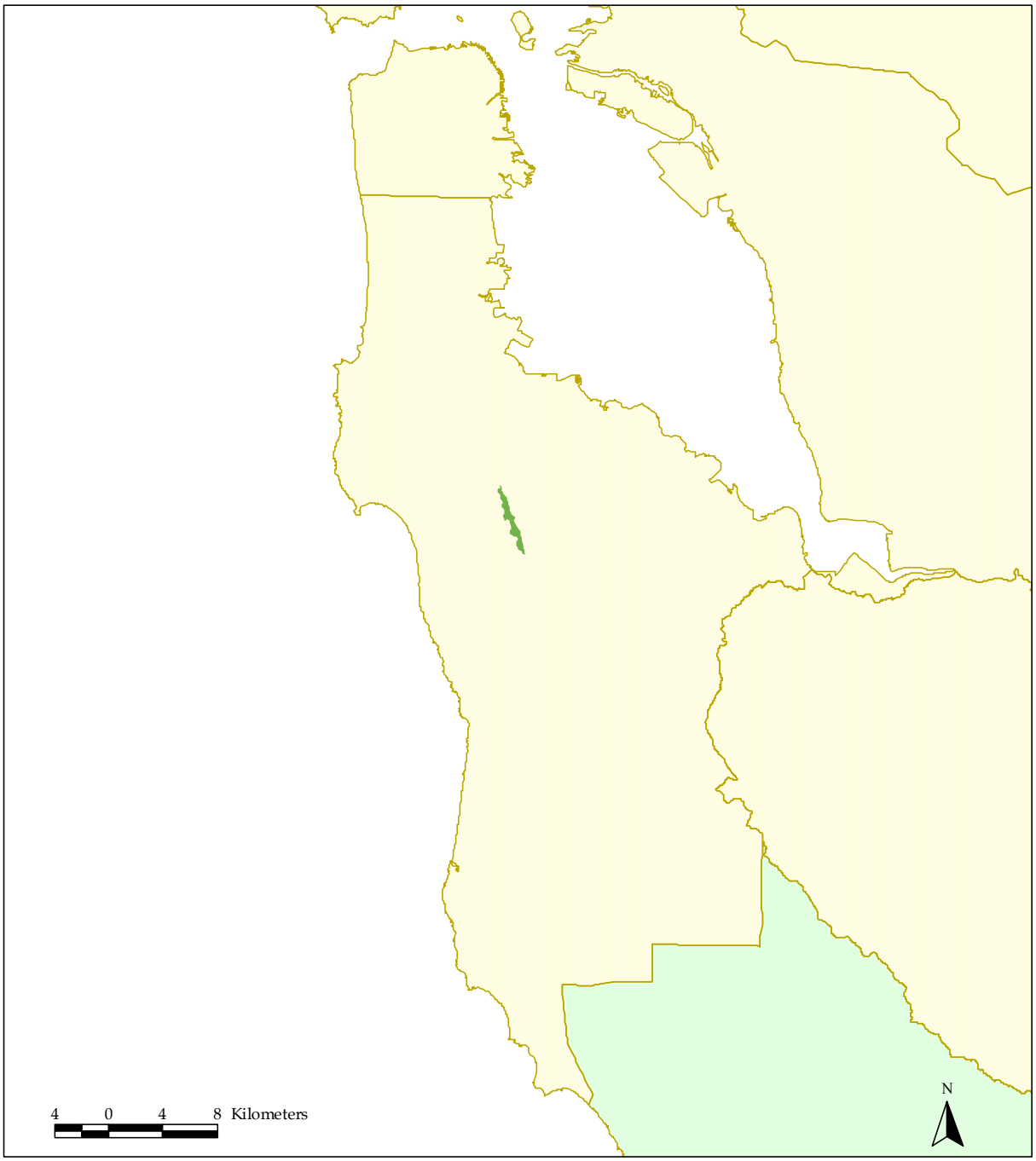
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

VENTURAN COASTAL SAGE SCRUB

Combined Priority Score:	**8**
Natural Community Code (Holland, 1986)	32300
Km^2 mapped in California	2102.1
Km^2 mapped in the Bay Area	1.0
Proportion of statewide extent found in the Bay Area	<0.1%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	8.8%
Additional area needed to meet protection goal (acres)	28.4
Proportion of California extent in protected status	8.7%
Statewide Status	S3.1 (somewhat common, very threatened)
Local Development Risk Score	3

Community Description Source: Holland, 1986	Low, mostly soft-woody shrubs, 0.5-2m tall, with crowns usually touching, but less dense than Central (Lucian) Coastal Scrub (32200) or Chaparral (37000), and typically with bare ground underneath and between shrubs. Growth occurs in late winter and spring, following the onset of winter rains. Most flowering occurs in spring, but some species continue into summer. Dormant and more or less deciduous in summer and fall. Adapted to fire by crown-sprouting. SITE FACTORS: On dry, more or less rocky slopes, often at lower elevations and on drier but less rocky sites than associated upper Sonoran (37100) and Chamise chaparrals (37200). DISTRIBUTION: From the South Coast Ranges to Cismontane, southern California and northern Baja California, usually below 3,000 feet (910m). Most abundant in coastal region south of Pt. Conception (see Central Coastal Scrub (32200), but extending inland to vicinity of Cajon and San Gorgonio passes in San Bernardino and Riverside counties.



VENTURAN COASTAL SAGE SCRUB

Percent Cover

< 30%

30-49%

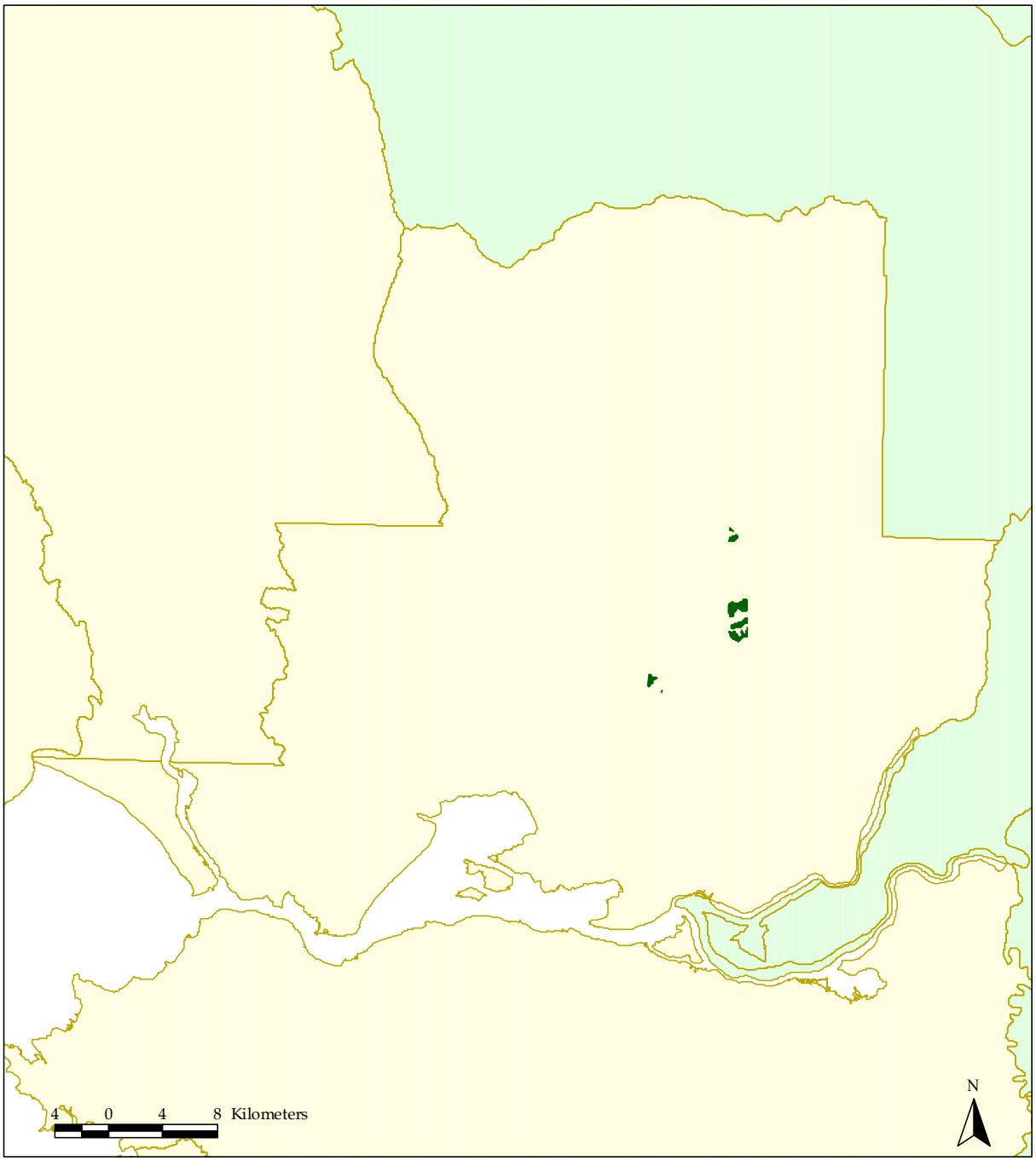
50-69%

> 70%

VALLEY NEEDLEGRASS GRASSLAND

Combined Priority Score:	**8**
Natural Community Code (Holland, 1986)	42110
Km^2 mapped in California	7.4
Km^2 mapped in the Bay Area	3.5
Proportion of statewide extent found in the Bay Area	47.4%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	40.9%
Additional area needed to meet protection goal (acres)	512.5
Proportion of California extent in protected status	21.7%
Statewide Status	S3.1 (somewhat common, very threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A midheight (to 2 feet) grassland dominated by perennial, tussock-forming *Nassella pulchra*. Native and introduced annuals occur between the perennials, often actually exceeding the bunchgrasses in cover. SITE FACTORS: Usually on fine-textured (often clay) soils, moist or even waterlogged during winter, but very dry in summer. Often interdigitates with Oak Woodlands (71100) on moister, better drained sites. DISTRIBUTION: Formerly extensive around the Sacramento, San Joaquin, and Salinas Valleys, as well as the Los Angeles Basin, but now much reduced. The relationship of this type to the Potrero Grasslands of the Peninsular Ranges needs clarification.



VALLEY NEEDLEGRASS GRASSLAND

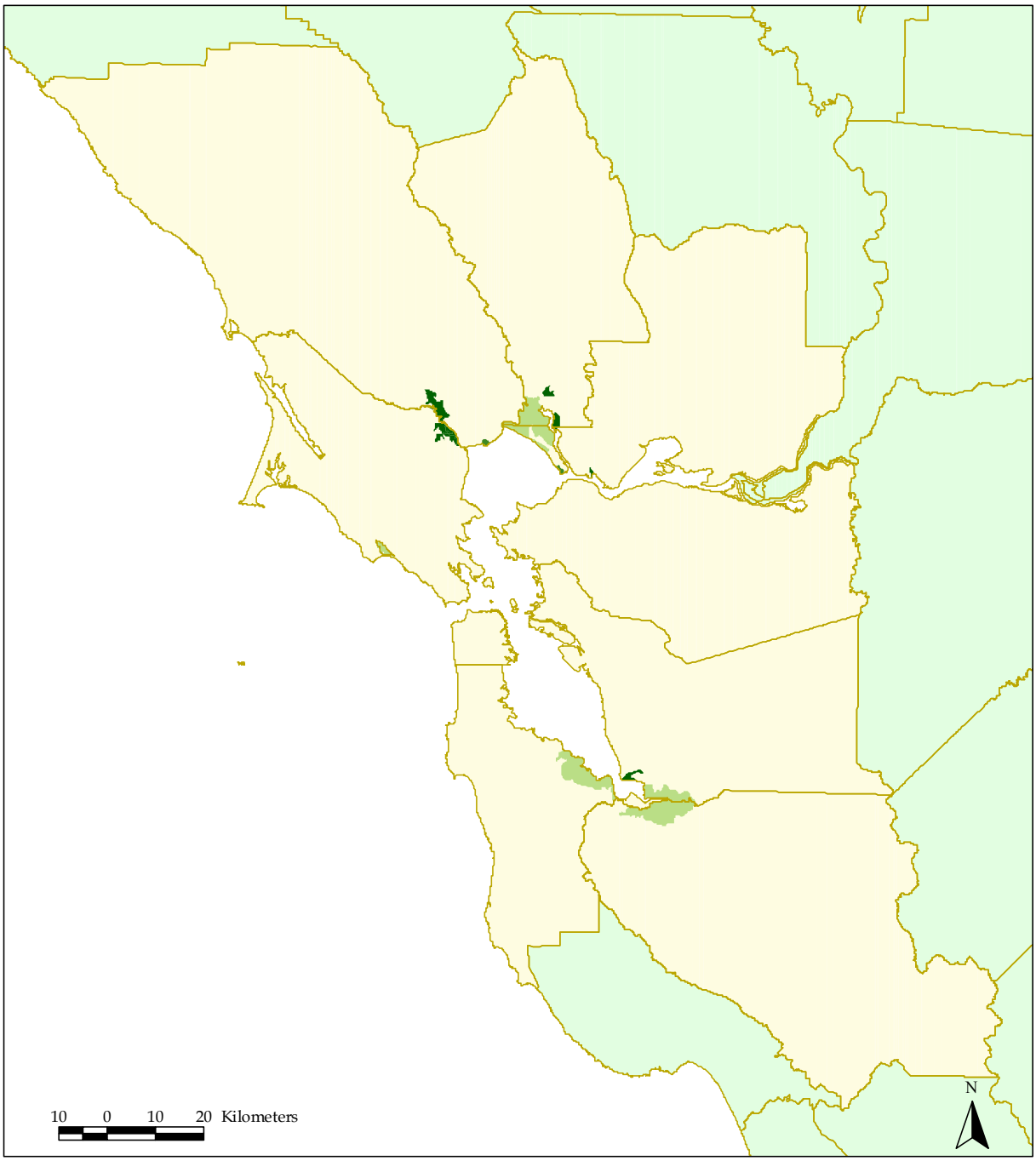
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

NORTHERN COASTAL SALT MARSH

Combined Priority Score:	**8**
Natural Community Code (Holland, 1986)	52110
Km^2 mapped in California	84.7
Km^2 mapped in the Bay Area	71.9
Proportion of statewide extent found in the Bay Area	84.9%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	63.2%
Additional area needed to meet protection goal (acres)	6533
Proportion of California extent in protected status	44.5%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	2

Community Description Source: Holland, 1986	Highly productive, herbaceous and suffructescent, salt-tolerant hydrophytes forming moderate to dense cover and up to 1m tall. Most species are active in summer, dormant in winter. Usually segregated horizontally with *Spartina* nearer the open water, *Salicornia* at mid-littoral elevations, and a richer mixture closer to high ground. SITE FACTORS: Usually found along sheltered inland margins of bays, lagoons, and estuaries. These hydric soils are subject to regular tidal inundation by salt water for at least part of each year. DISTRIBUTION: Along the coast from the Oregon border south to about Pt. Conception. Intergrades with Southern Coastal Salt Marsh (52120) over a considerable portion of the south central coast. Extensively developed around Humboldt Bay and other Humboldt Co. areas; Tomales Bay, Marin Co.; Elkhorn Slough, Monterey Co.; Morro Bay, San Luis Obispo Co.; and very extensively in the San Francisco Bay Area.



NORTHERN COASTAL SALT MARSH

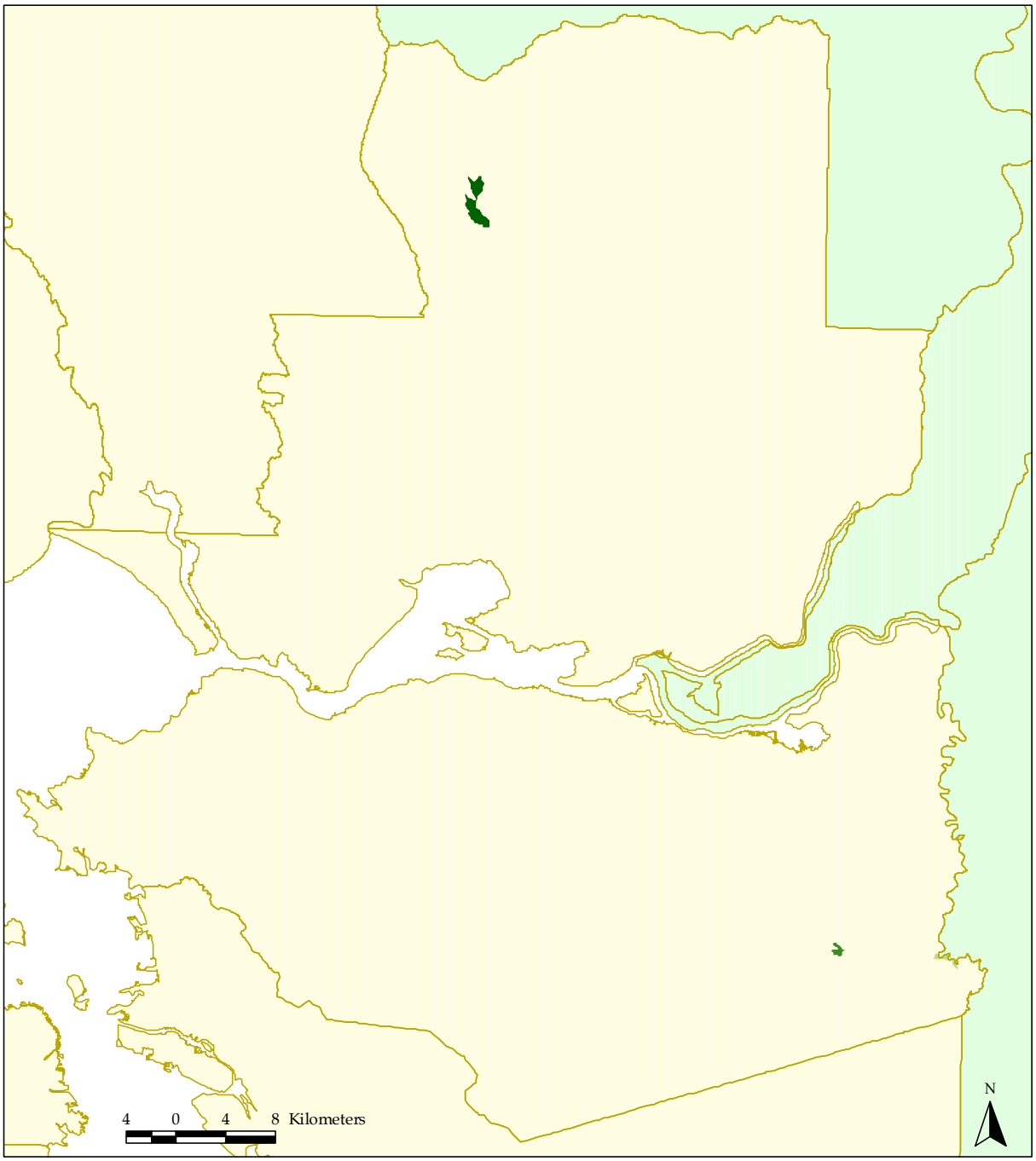
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

GREAT VALLEY COTTONWOOD RIPARIAN FOREST

Combined Priority Score:	**8**
Natural Community Code (Holland, 1986)	61410
Km^2 mapped in California	330.5
Km^2 mapped in the Bay Area	4.0
Proportion of statewide extent found in the Bay Area	1.2%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	977.5
Proportion of California extent in protected status	19%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	2

Community Description Source: Holland, 1986	A dense, broadleafed, winter-deciduous riparian forest dominated by *Populus fremontii* and *Salix goodingii*. Understories are dense, with abundant vegetative reproduction of canopy dominants. *Vitis californica* is the most conspicuous liana. Scattered seedlings and saplings of shade-tolerant species such as *Acer negundo* var. *californica* or *Fraxinus latifolia* may be found, but frequent flooding prevents their reaching into the canopy. SITE FACTORS: Fine-grained alluvial soils near perennial or nearly-perennial streams that provide subsurface irrigation even when the channel is dry. These sites are inundated yearly during spring, resulting in annual input of nutrients, soil, and new germination sites. Intergrades at sites higher and farther from the river with Great Valley Mixed Riparian Forest (61420); and with Great Valley Willow Scrub (63410) on sites closer to the river that are subject to more severe flooding disturbance. DISTRIBUTION: Formerly extensive along the major low-gradient (depositional) streams throughout the Great Valley, but now reduced to scattered, isolated remnants or young stands because of flood control, water diversion, agricultural development, and urban expansion; typically below about 1,000 feet in the north, 3000 feet in the south.



GREAT VALLEY COTTONWOOD RIPARIAN FOREST

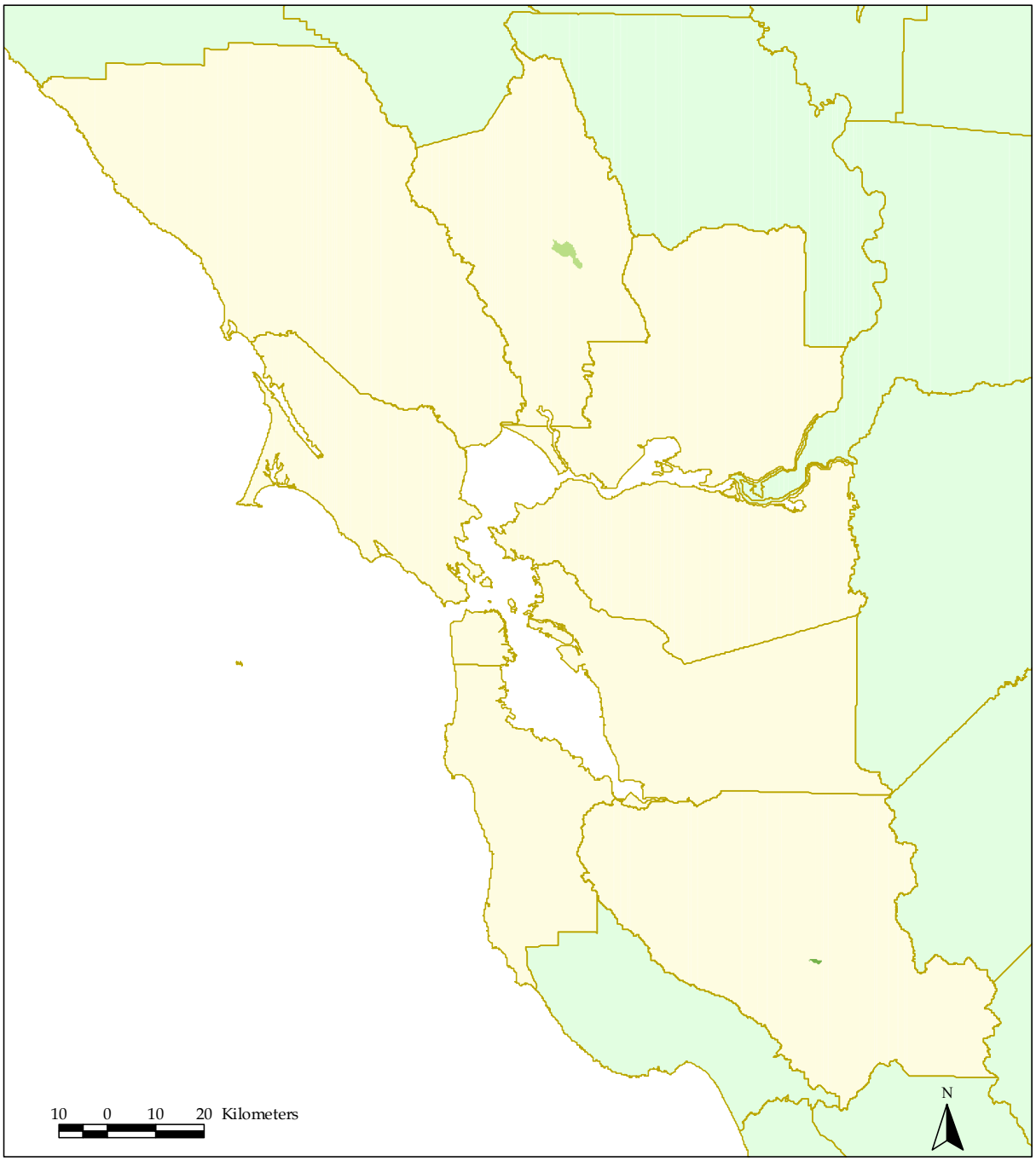
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MIXED SERPENTINE CHAPARRAL

Combined Priority Score:	**7**
Natural Community Code (Holland, 1986)	37610
Km^2 mapped in California	217.2
Km^2 mapped in the Bay Area	3.5
Proportion of statewide extent found in the Bay Area	1.6%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	173.1
Proportion of California extent in protected status	1.0%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	1

Community Description Source: Adapted from Holland, 1986.	Scrubby sclerophyllous shrublands dominated by any of several shrubs or small conifers that are edaphically restricted to serpentine. Mesic Serpentine Chaparral is dominated by *Adenostoma fasciculatum* and *Heteromeles arbutifolia.* SITE FACTORS: Shallow, stony, infertile soils derived from serpentine. Usually below about 5,000 feet. DISTRIBUTION: Scattered throughout Central and Northern California, wherever serpentine outcrops occur.



MIXED SERPENTINE CHAPARRAL

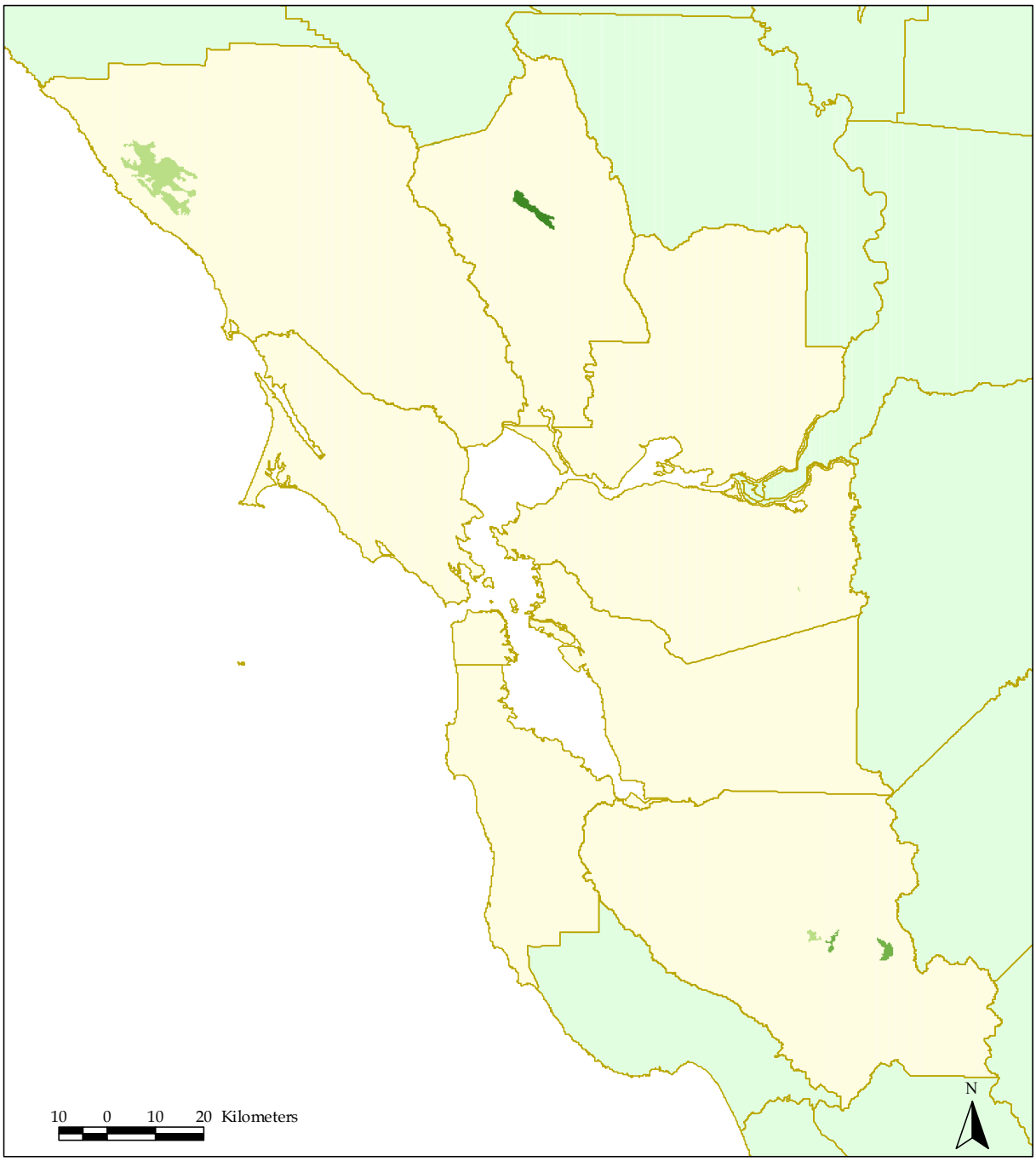
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

VALLEY OAK WOODLAND

Combined Priority Score:	**7**
Natural Community Code (Holland, 1986)	71130
Km^2 mapped in California	922
Km^2 mapped in the Bay Area	24.2
Proportion of statewide extent found in the Bay Area	2.6%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	18.5%
Additional area needed to meet protection goal (acres)	88.2
Proportion of California extent in protected status	1.3%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Similar to Oregon Oak Woodland (71110) and Blue Oak Woodland (71140), but typically more open, forming a grassy-understoried savanna rather than a closed woodland. *Quercus lobata* is usually the only tree present. This winter-deciduous species is California's largest broad-leaved tree, with mature individuals reaching 15-35m. Most stands consist of open-canopy growth form trees and seldom exceed 30-40% absolute cover. SITE FACTORS: On deep, well-drained alluvial soils, usually in valley bottoms, apparently with more moisture in summer than in Blue Oak Woodland (71140). Intergrades with Great Valley Valley Oak Riparian Forest (61430) near rivers and with Blue Oak Woodland (71140) on drier slopes. Also found on nonalluvial settings in the South Coast and Transverse ranges. Fire may have prevented some valley oak stands from succeeding to Ponderosa Pine (84130, 84210) or Coulter Pine (84140) forests before fire suppression. DISTRIBUTION: Sacramento and San Joaquin valleys adjacent to the Sierra Nevada foothills; valleys of the Coast Ranges from Lake County to western Los Angeles County. Usually below 2,000 feet (610m).



VALLEY OAK WOODLAND

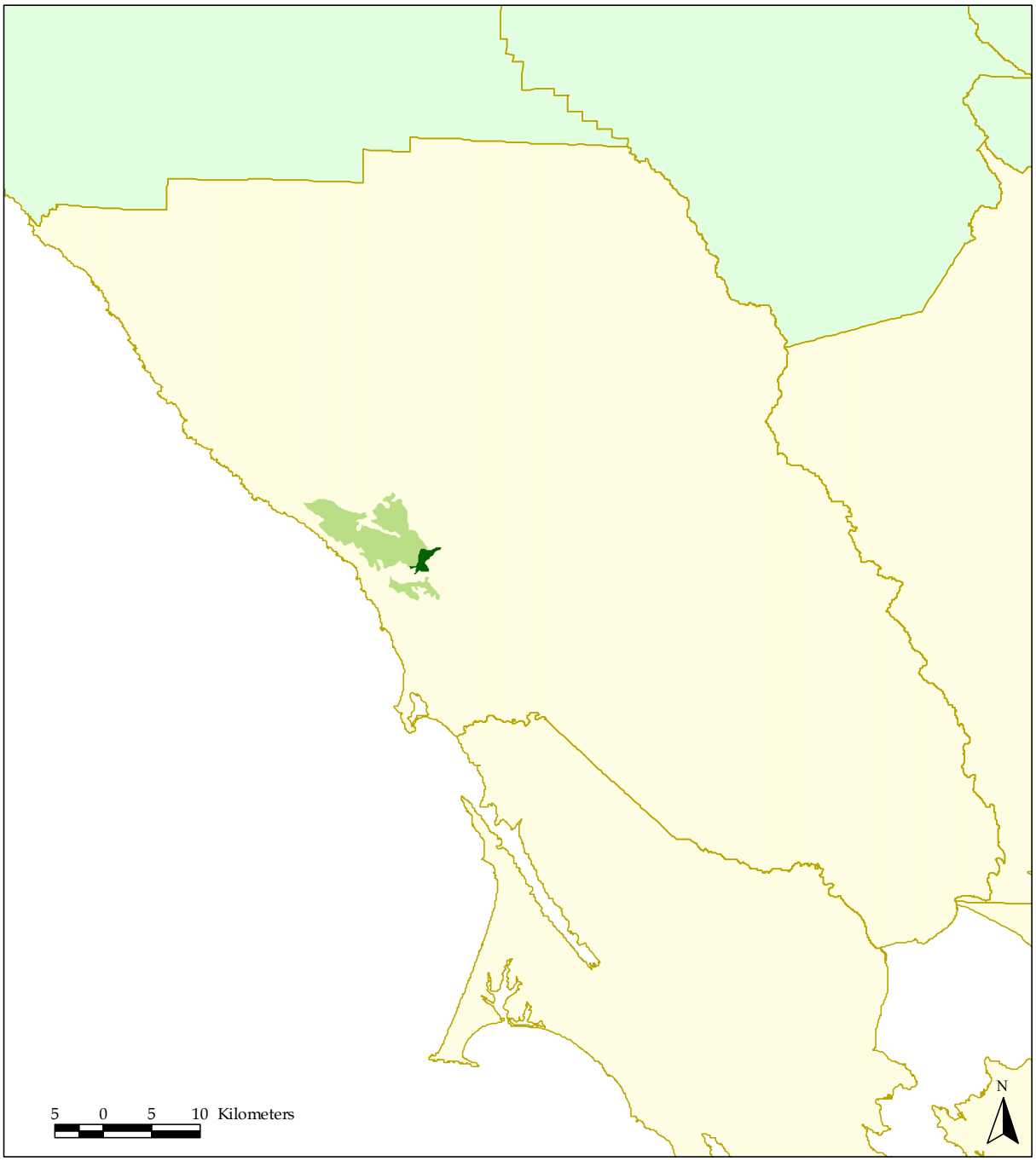
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

NORTH COAST RIPARIAN SCRUB

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	63100
Km^2 mapped in California	99.3
Km^2 mapped in the Bay Area	15.3
Proportion of statewide extent found in the Bay Area	15.3%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	755.9
Proportion of California extent in protected status	3.9%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	An early seral, broadleafed deciduous riparian thicket usually dominated by any of several *Salix* species, together with several other fast growing shrubs and vines. SITE FACTORS: Sand and gravel bars along and at the mouths of streams, within the coastal fog incursion zone. DISTRIBUTION: Along coastal streams from Sonoma or Mendocino counties north into Oregon, usually below 1,000 feet.



NORTH COAST RIPARIAN SCRUB

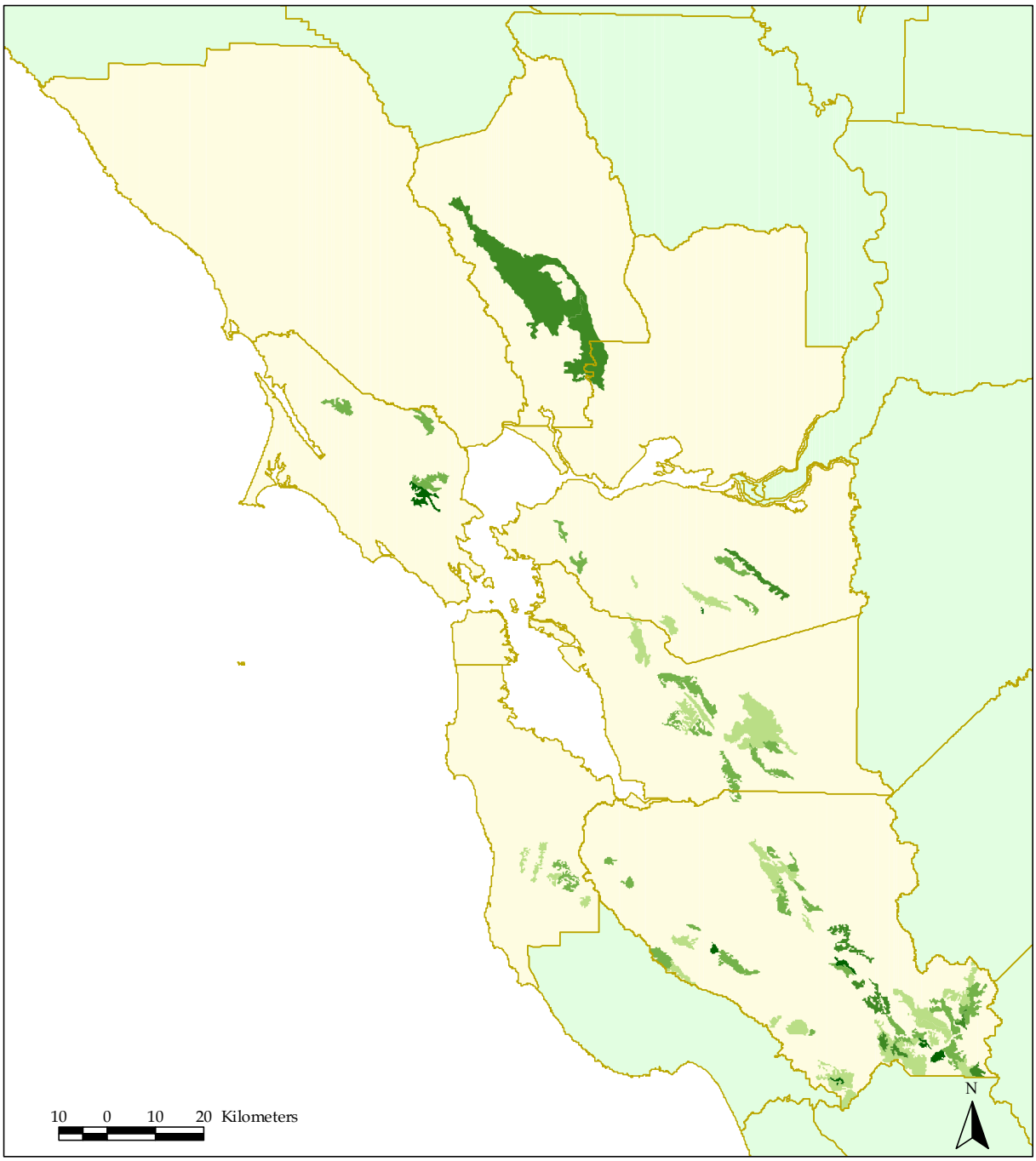
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COAST LIVE OAK WOODLAND

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	71160
Km² mapped in California	1172.2
Km² mapped in the Bay Area	403.6
Proportion of statewide extent found in the Bay Area	34.4%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	19.8%
Additional area needed to meet protection goal (acres)	196.3
Proportion of California extent in protected status	4%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Very similar to Oregon Oak Woodland (71110) with only one dominant tree, *Quercus agrifoli*a, which is evergreen and reaches 10-25m in height. The shrub layer is poorly developed, but may include *Heteromeles arbutifolia, Ribes* spp., *Rhus laurina, or Sambucus mexicana.* The herb component is continuous and dominated by *Bromus diandrus* and several other introduced taxa. SITE FACTORS: Typically on north-facing slopes and shaded ravines in the south and more exposed sites in the north. Intergrades with Coastal Scrub (32000) and Upper Mixed Sonoran Chaparral (37100) on drier sites and with Coast Live Oak Forest (81310) or Mixed Evergreen Forest (81100) on moister sites. DISTRIBUTION: Outer South Coast Ranges, and coastal slopes of Transverse and Peninsular ranges, usually below 4,000 feet (1220m). Intergrades with Blue Oak Woodland (71120) in the inner South Coast Ranges and with Engelmann Oak Woodland (71180) in the interior of southern California.



COAST LIVE OAK WOODLAND

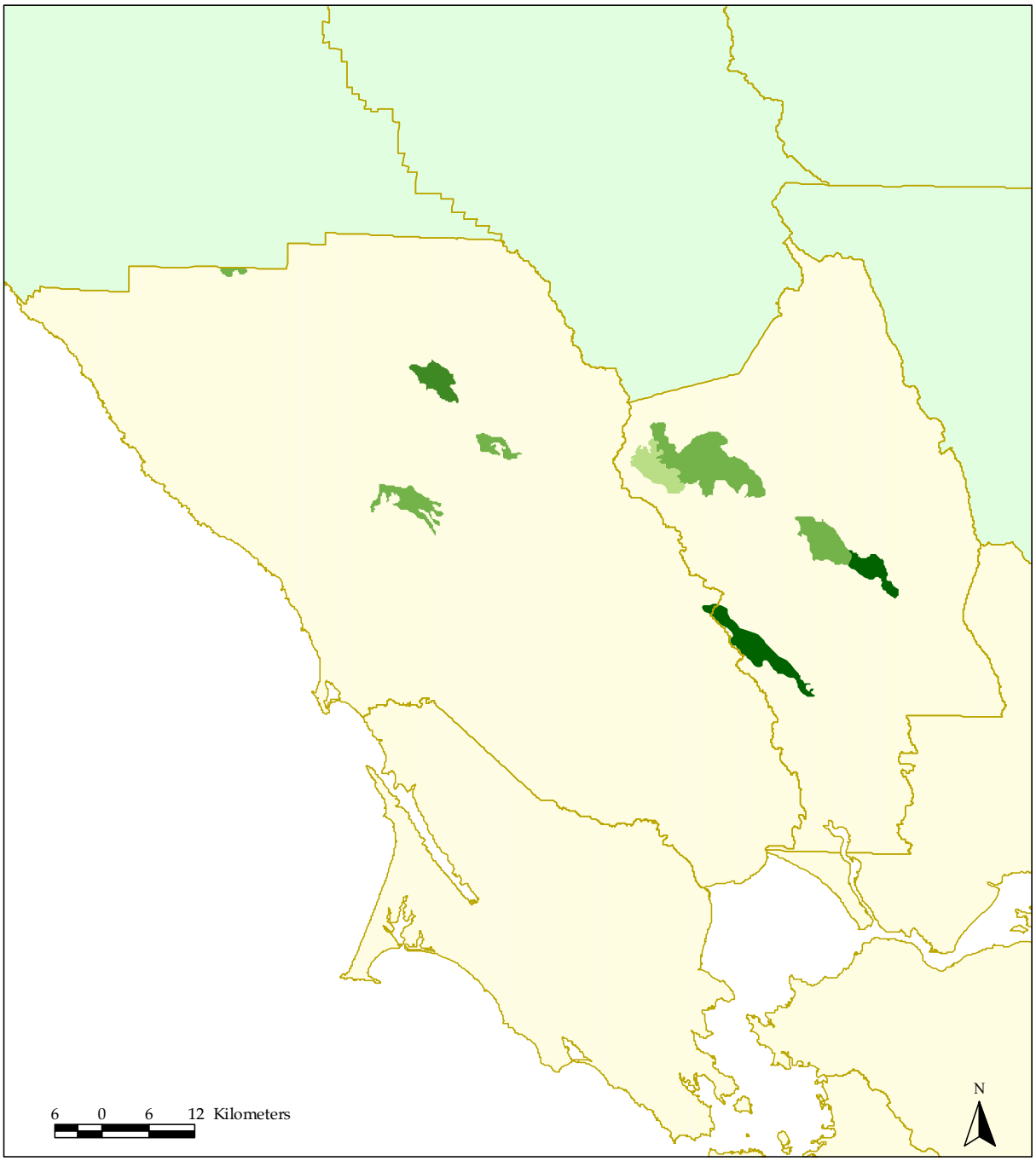
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MIXED NORTH SLOPE CISMONTANE WOODLAND

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	71420
Km^2 mapped in California	1005.3
Km^2 mapped in the Bay Area	287.0
Proportion of statewide extent found in the Bay Area	28.5%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	4.1%
Additional area needed to meet protection goal (acres)	11,299.0
Proportion of California extent in protected status	1.7%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Dominated by broad-leaved trees, 7-20m tall, varying from nearly closed forests on moist and/or fine-textured soils. Valley and Foothill Grassland species (42000) predominate in the openings between the trees; other herbaceous species characterize the shaded areas. Open savannas, almost entirely of *Quercus garryana*, and very similar in aspect to Valley Oak Woodland (71130), may occur in valley bottoms. The dominant trees include evergreen, winter-deciduous and summer-deciduous species, but with fewer sclerophyllous trees than Mixed Evergreen Forest (81100). Winter is characterized by germination of annual understory species; flowering of these species and leafing out of most deciduous trees occur in spring. In summer the trees grow at reduce rates and the annual herbs die. SITE FACTORS: On relatively fine-textured soils of valleys and slopes; often around rock outcrops on slopes. Intergrades with Valley and Foothill Grasslands (42000) on drier, fine-textured soils, with Upper Sonoran Mixed Chaparral (37100) on dry, rocky soils, and with Mixed Evergreen Forest (81100) or Mixed North Slope Forest (81500) on moister soils (often in ravines or adjacent north-facing slopes) or at higher elevations. DISTRIBUTION: Valleys and lower slopes of the Klamath and North Coast ranges, from Humboldt and Siskiyou counties to Marin County, usually away from the coast, between 500 feet and 3,000 feet (150m and 915m). Intergrades with Valley Oak Woodland (71130), Blue Oak Woodland (71140), or Interior Live Oak Woodland (71150) towards the south.



MIXED NORTH SLOPE CISMONTANE WOODLAND

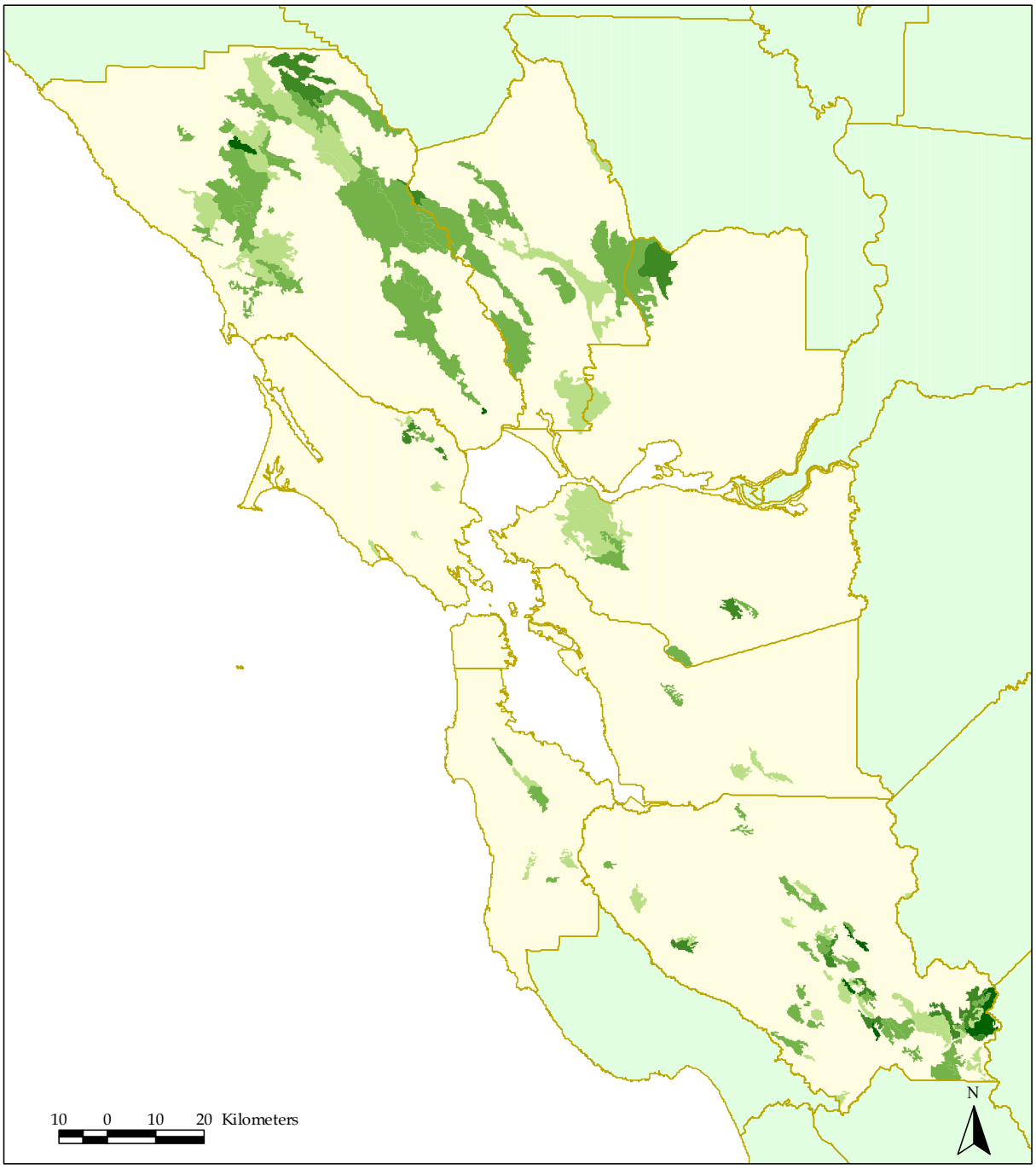
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COAST LIVE OAK FOREST

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	81310
Km^2 mapped in California	2193.7
Km^2 mapped in the Bay Area	883.4
Proportion of statewide extent found in the Bay Area	40.3%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	12.4%
Additional area needed to meet protection goal (acres)	16,569.8
Proportion of California extent in protected status	4.9%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Similar to Mixed Evergreen Forest (81100) and Coast Live Oak Woodland (71160), not quite so dense and with fewer tree species than the former; more dense than the latter, forming a forest instead of a woodland. Dominated by *Quercus agrifolia*, a broad-crowned, sclerophyllous evergreen tree up to 25m tall. The growing season may begin earlier than in Mixed Evergreen Forest, at least in the southern coastal locations, whereas a greater reduction of growth probably occurs during the summer-fall drought.. SITE FACTORS: Similar to Mixed Evergreen Forest (81100) and Coast Live Oak Woodland (71160), but drier than the former and moister than the latter. May intergrade with these locally as well as regionally. May occur on valley bottoms as well as on slopes. DISTRIBUTION: Coast ranges from Sonoma Co. to Santa Barbara Co. Most common away from the coast in the north and near the coast in the south. Often adjacent to Mixed Evergreen Forest (81100) in the north or merging with Coast Live Oak Woodland (71160) in the south. Elevation usually below 3,000 feet (1000m).



COAST LIVE OAK FOREST

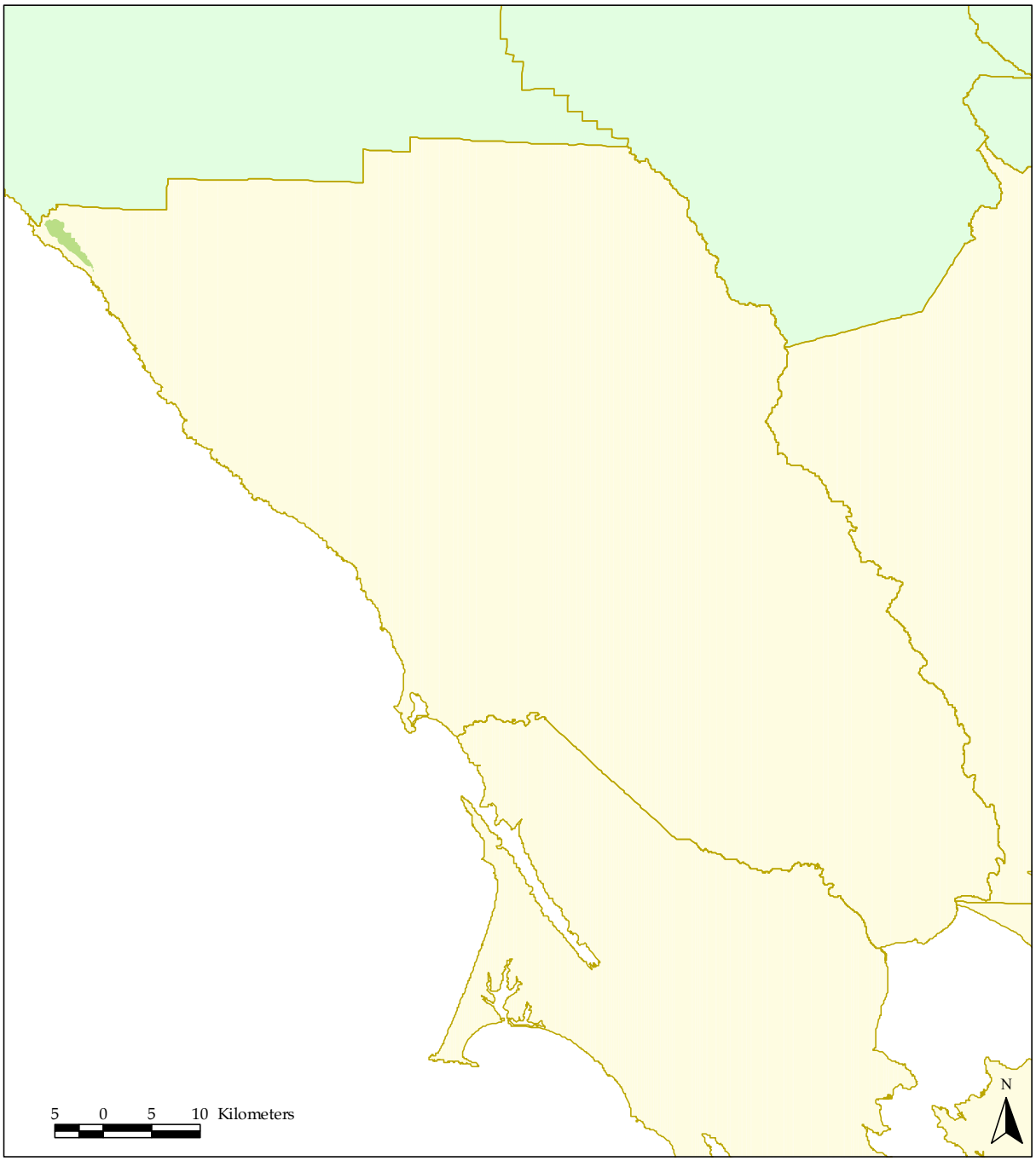
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MENDOCINO PYGMY CYPRESS FOREST

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	83161
Km^2 mapped in California	10.5
Km^2 mapped in the Bay Area	0.7
Proportion of statewide extent found in the Bay Area	6.7%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	34.9
Proportion of California extent in protected status	10.5%
Statewide Status	S2.1 (rare, very threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A low, gnarled, stunted "forest" to 3m tall (much taller on better soil), often quite scattered. Dry sites tend to have a dense, shrubby understory; mesic sites are more herbaceous. Most growth and flowering occurs in the spring and early summer. SITE FACTORS: Confined to poorly drained, acidic podzols (Blacklock series), low in nutrients and flooded during winter. Intergrades with Upland Redwood Forest (82320) and Sitka Spruce-Grand Fir Forest (82100) on better sites, often with Bishop Pine Forest (83120) on these ecotones. DISTRIBUTION: On coastal terraces, primarily between Fort Bragg and Albion on the Mendocino coast, but with scattered stands south to the central Sonoma County coast.



MENDOCINO PYGMY CYPRESS FOREST

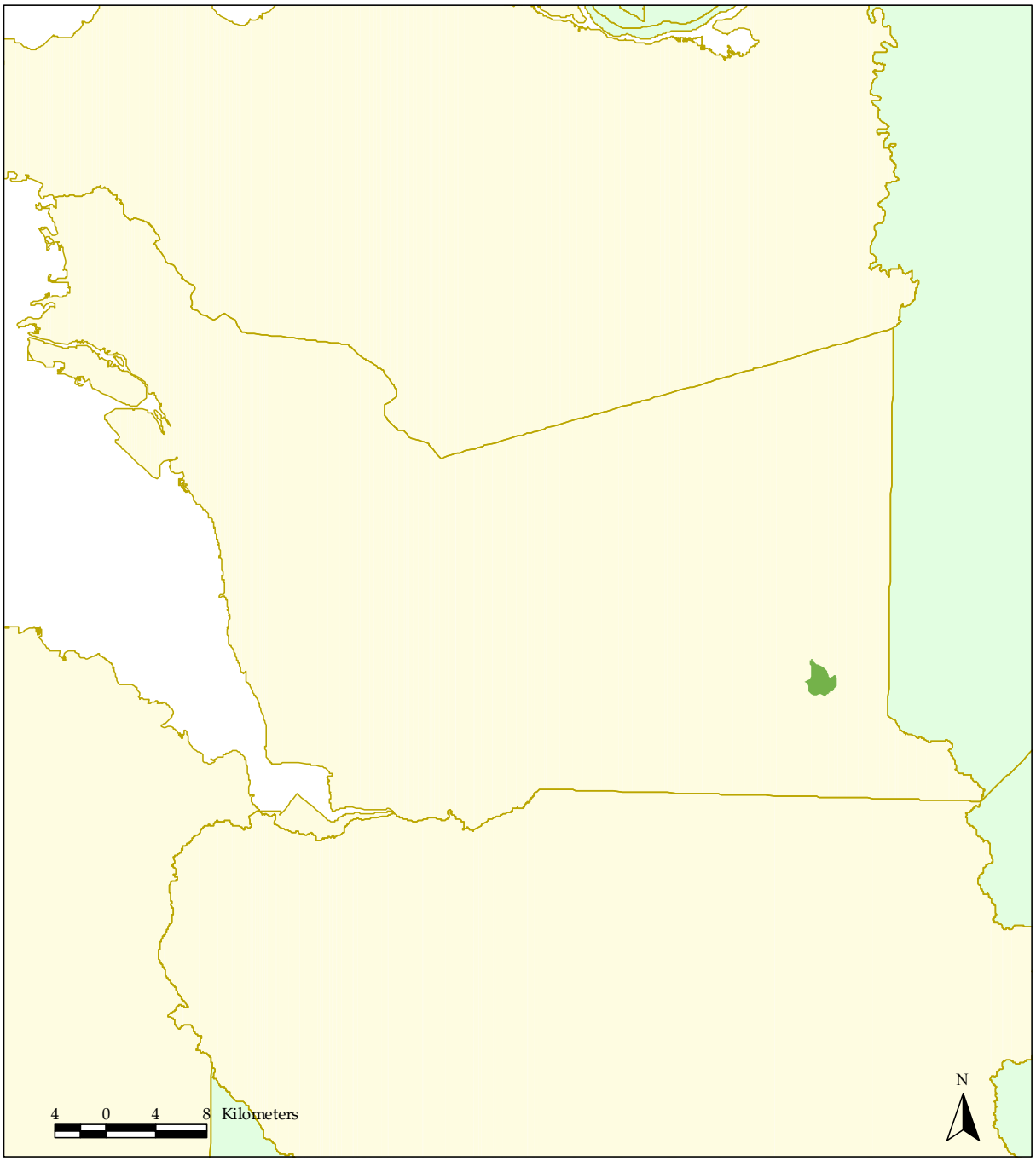
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

NORTHERN INTERIOR CYPRESS FOREST

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	83220
Km² mapped in California	182.9
Km² mapped in the Bay Area	1.9
Proportion of statewide extent found in the Bay Area	1.0%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	93.4
Proportion of California extent in protected status	0.7%
Statewide Status	S2.2 (rare, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	An open, fire-maintained scrubby "forest" similar to Knobcone Pine Forest (83210) but dominated by one of several *Cupressus* species. These stands may be as much as 15m tall, but usually are lower. SITE FACTORS: On dry, rocky, sterile, often ultramafic soils, frequently associated with Serpentine Chaparral (37600). Intergrades on less severe sites with Upper Sonoran Mixed Chaparral (37100), Montane Chaparral (37500), or Knobcone Pine Forest (83210); and on more mesic sites with Mixed Evergreen Forest (81100) or Montane Coniferous Forest (84000,85000).. DISTRIBUTION: Scattered through the Siskiyou Mountains, North and South Coast Ranges, Cascades and northern Sierra Nevada. Combining the four species into a single element is open to question, but does not reflect a common pattern of occurring on serpentine or other sterile substrate and moisture status intermediate between mesic Coastal Closed Cone Conifer Forests (83100) and xeric Southern Interior Cypress Forests (83330).



NORTHERN INTERIOR CYPRESS FOREST

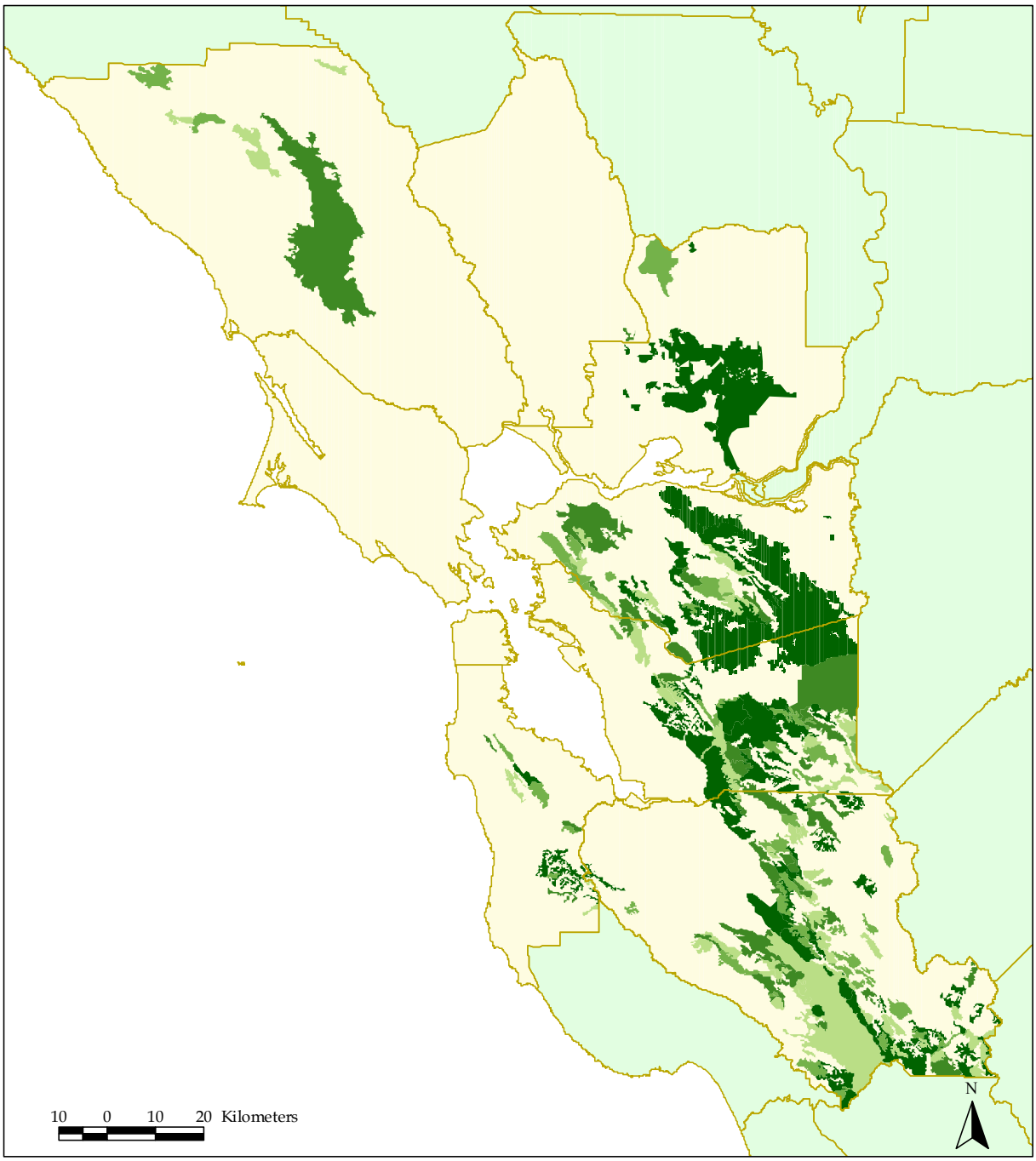
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

NON-NATIVE GRASSLAND

Combined Priority Score:	**6**
Natural Community Code (Holland, 1986)	42200
Km^2 mapped in California	27,483.4
Km^2 mapped in the Bay Area	2272.5
Proportion of statewide extent found in the Bay Area	8.3%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	18.2%
Additional area needed to meet protection goal (acres)	10,220.5
Proportion of California extent in protected status	4.8%
Statewide Status	S4 (widespread, secure)
Local Development Risk Score	3

Community Description Source: Holland, 1986	A dense to sparse cover of annual grasses with flowering culms 0.2-0.5 (1.0)m high. Often associated with numerous species of showy-flowered, native annual forbs ("wildflowers"), especially in years of favorable rainfall. Germination occurs with the onset of the late fall rains; growth, flowering, and seed-set occur from winter through spring. With a few exceptions, the plants are dead through the summer-fall dry season, persisting as seeds. SITE FACTORS: On fine-textured, usually clay soils, moist or even waterlogged during the winter rainy season and very dry during the summer and fall. Oak Woodland (71100) is often adjacent on moister, better drained soils. DISTRIBUTION: Valleys and foothills of most of California, except for the north coastal and desert regions. Usually below 3,000 feet, but reaching 4,000 feet in the Tehachapi Mountains and interior San Diego County. Intergrades with Coastal Prairie (41000) along the central coast. Formerly occupied large portions of the Sacramento, San Joaquin, and Salinas Valleys as well as the Los Angeles Basin, areas that are now agricultural or urban.



NON-NATIVE GRASSLAND

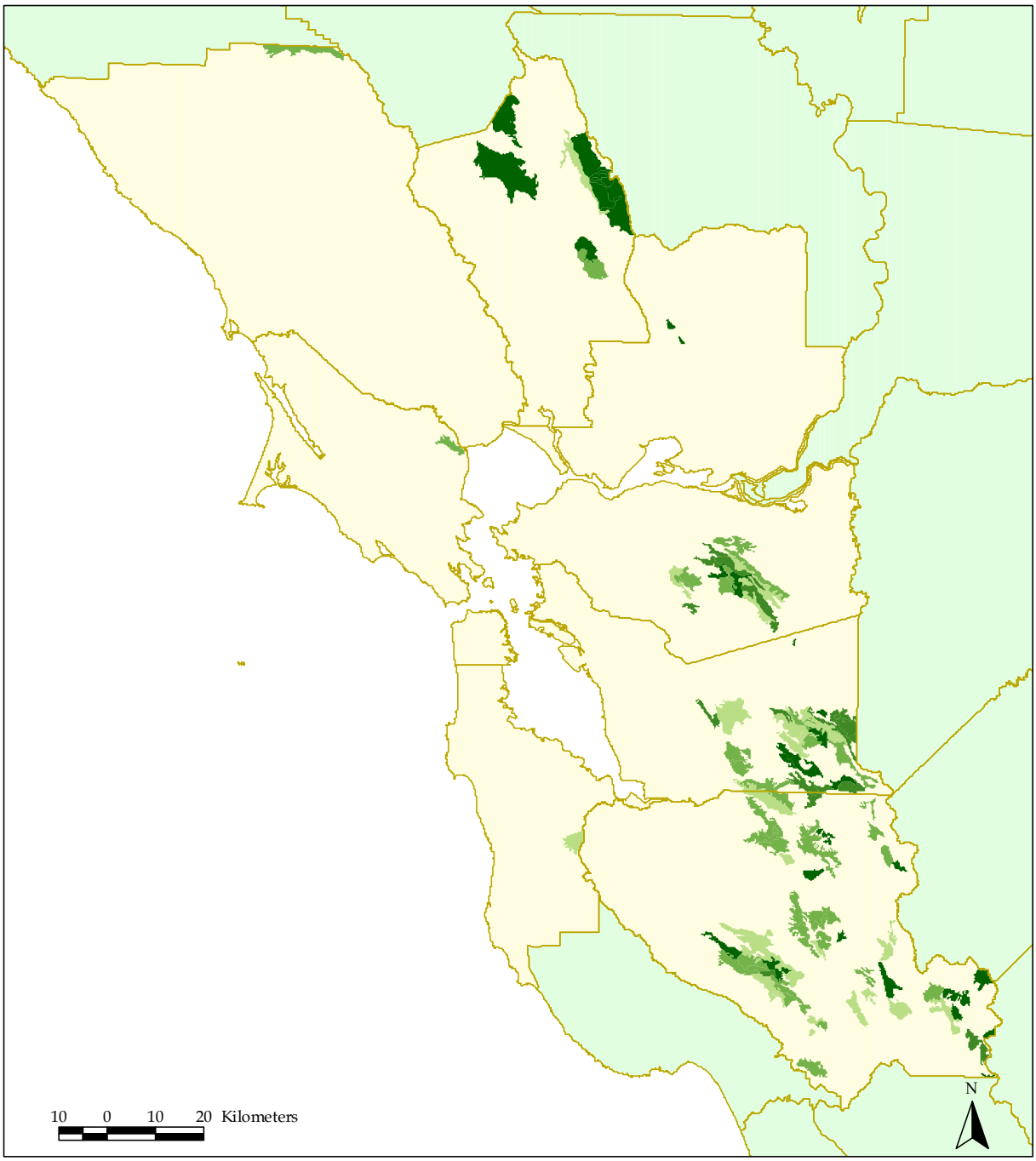
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

BLUE OAK WOODLAND

Combined Priority Score:	**5**
Natural Community Code (Holland, 1986)	71140
Km² mapped in California	10,451.8
Km² mapped in the Bay Area	628.3
Proportion of statewide extent found in the Bay Area	6.0%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	19.5%
Additional area needed to meet protection goal (acres)	846.9
Proportion of California extent in protected status	3.8%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A highly variable climax woodland dominated by *Quercus douglasii*, but usually including individuals of several other oaks as well as *Pinus sabiniana*. Stands vary from open savannas with grassy understories (usually at lower elevations) to fairly dense woodlands with shrubby understories. SITE FACTORS: Well-drained soils in Mediterranean California usually below 3,000-4,000 feet. Frequent fire favors blue oak (a long-lived stump sprouter) over foothill pine. Supplanted at higher elevations and more mesic sites by Black Oak Woodland (71120) or Foothill Pine-Oak Woodlands (71410). Interdigitates on more mesic sites at lower elevations with Valley and Foothill Grasslands (42000), where it is largely confined to north slope and canyons. DISTRIBUTION: Valleys and lower slopes of the southern and interior North Coast Ranges, the South Coast Ranges, and the western foothills of the Sierra Nevada, almost completely encircling the Great Valley.



BLUE OAK WOODLAND

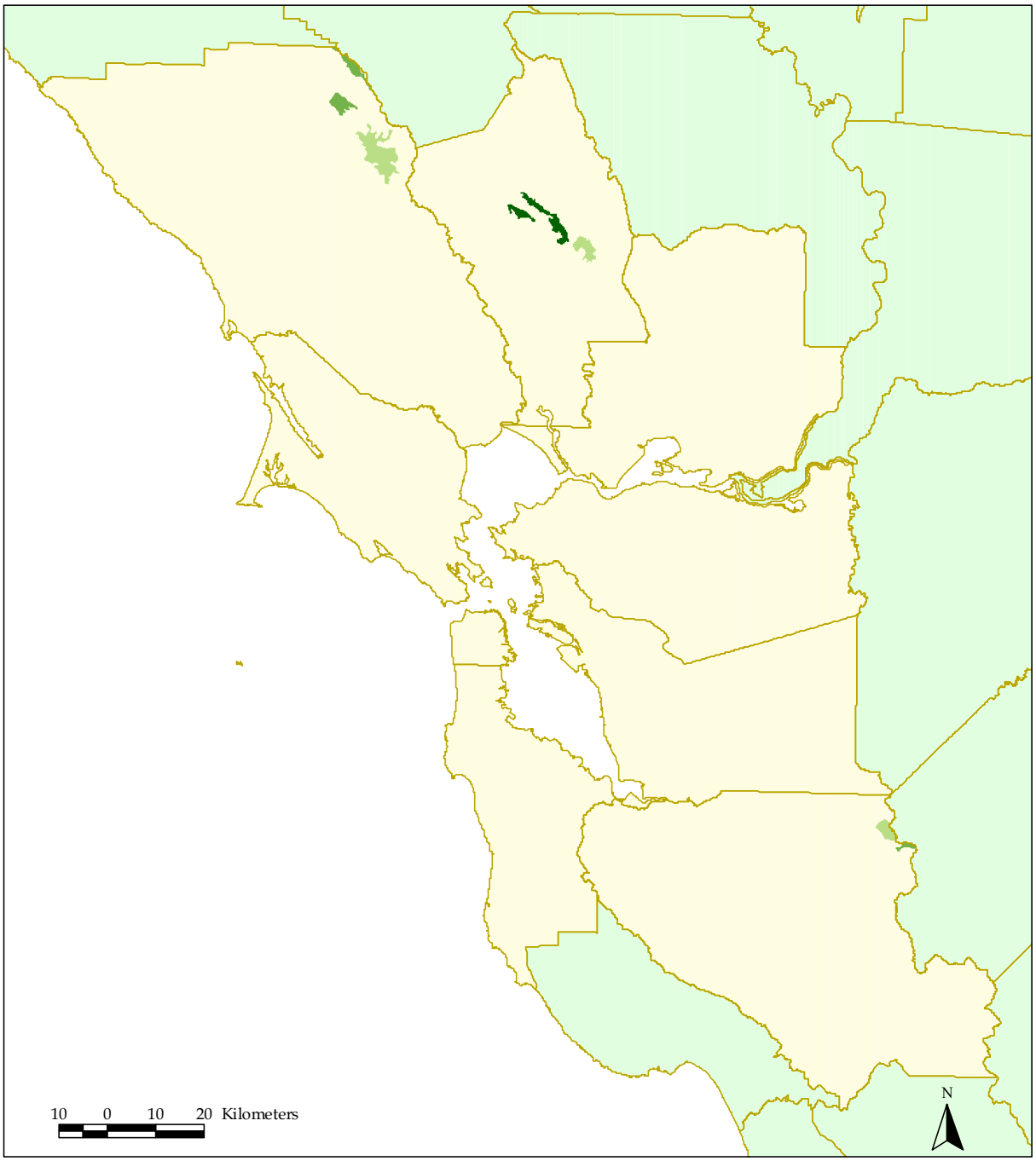
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

SERPENTINE FOOTHILL PINE-CHAPARRAL WOODLAND

Combined Priority Score:	**5**
Natural Community Code (Holland, 1986)	71321
Km^2 mapped in California	836.7
Km^2 mapped in the Bay Area	42.3
Proportion of statewide extent found in the Bay Area	5.1%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	1.5%
Additional area needed to meet protection goal (acres)	1,926.2
Proportion of California extent in protected status	2.8%
Statewide Status	S3.2 (somewhat common, threatened)

Local Development Risk Score Source: Holland, 1986	A usually open woodland of Foothill Pines emergent from a moderate to dense, shrubby cover similar to Mixed Serpentine Chaparral (37610). SITE FACTORS: Low-nutrient, xeric, rocky sites with ultramafic substrates. Usually at lower elevations or on more xeric exposures than Westside Ponderosa Pine Forest (84210). Intergrades with Serpentine Chaparral (37600) on flatter, more mesic sites. DISTRIBUTION: Widely scattered, on serpentine areas throughout the chaparral zone, usually below 5,000-6,000 feet.



SERPENTINE FOOTHILL PINE-CHAPARRAL WOODLAND

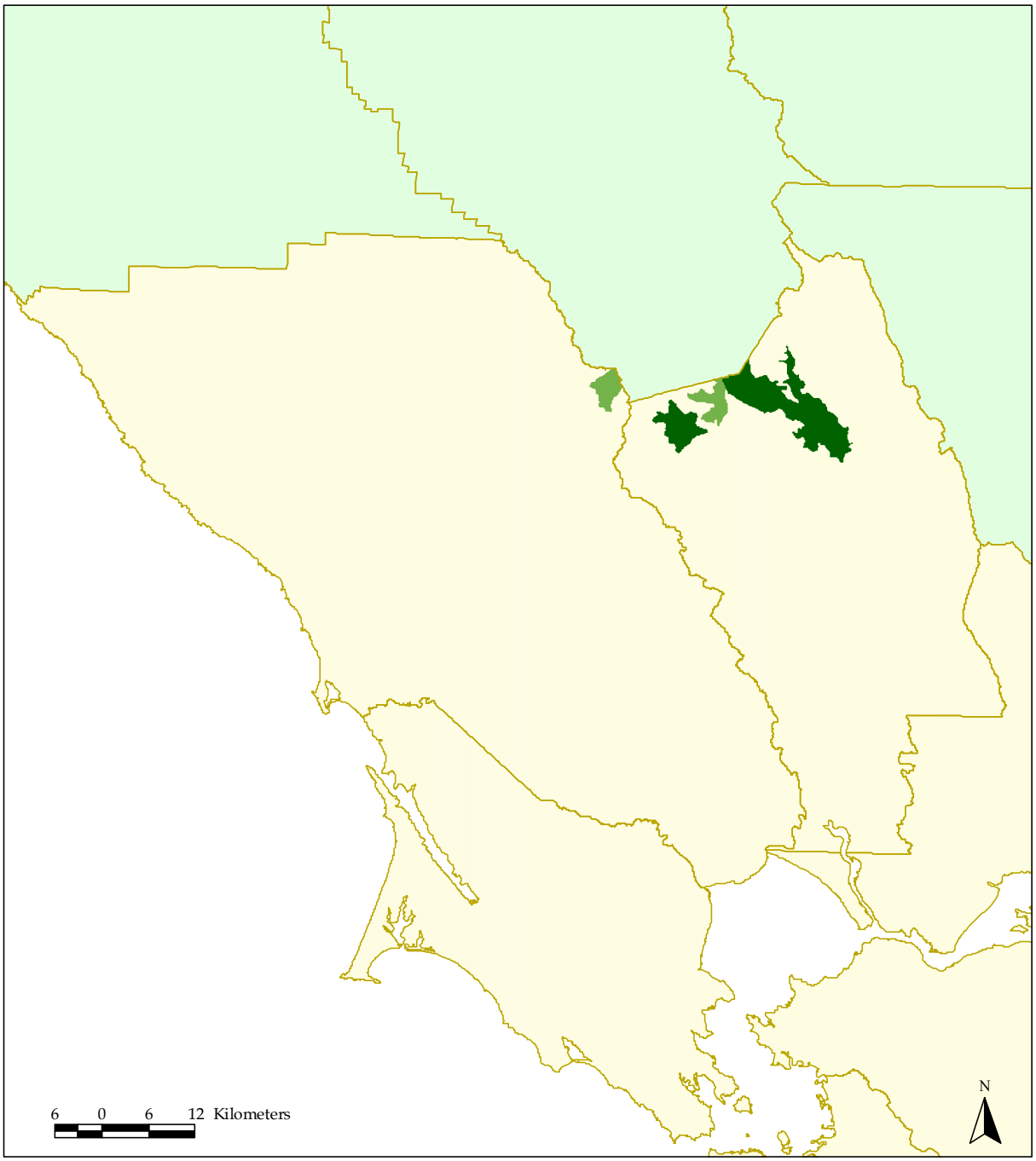
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

NON-SERPENTINE FOOTHILL PINE WOODLAND

Combined Priority Score:	**5**
Natural Community Code (Holland, 1986)	71322
Km^2 mapped in California	787.8
Km^2 mapped in the Bay Area	108.0
Proportion of statewide extent found in the Bay Area	13.7
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	7.4%
Additional area needed to meet protection goal (acres)	3,350.8
Proportion of California extent in protected status	8.4%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Dominated by evergreen sclerophyls, often impenetrable, with an open canopy of emergent *Pinus sabiniana*. Shrub canopy composition varies considerably, but usually is dominated by species of *Arctostaphylos, Ceanothus,* or *Quercus.* SITE FACTORS: Often seral to Westside Ponderosa Pine Forest (84210), Sierran Mixed Conifer Forest (84230), or Coast Range Mixed Conifer Forest (84110) following fire, logging, or other disturbance. Also occurs as an edaphic disclimax on extremely xeric or shallow-soiled sites within these types. DISTRIBUTION: Along the Sierra Nevada, Coast Ranges, and western Transverse Ranges, generally near the transition between chaparral and conifer forests.



NON-SERPENTINE FOOTHILL PINE WOODLAND

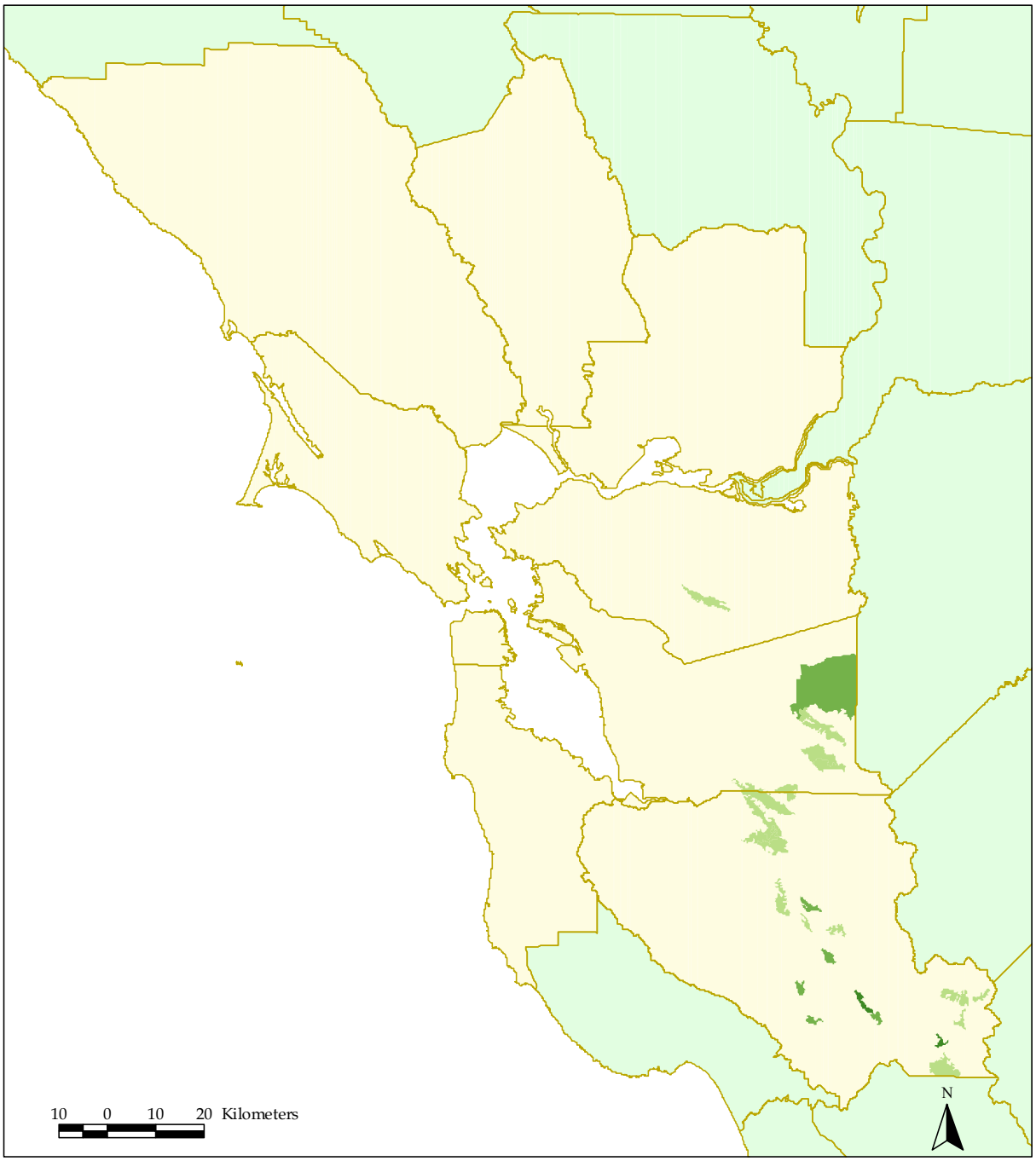
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

DIABLAN SAGE SCRUB

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	32600
Km² mapped in California	1,107.3
Km² mapped in the Bay Area	82.0
Proportion of statewide extent found in the Bay Area	7.4%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	11.6%
Additional area needed to meet protection goal (acres)	1,703.9
Proportion of California extent in protected status	2.4%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Sour*ce:* Holland, 1986	Both Northern (32100) and Central (32200) Coastal Scrubs pass into Diablan Sage Scrub in the drier interior. Stands are dominated by *Artemisia californica, Eriogonum fasciculatum,* and *Salvia mellifera* with plenty of *Mimulus aurantiacus* also present. In comparison with other Coastal Scrubs, this type has a poorer shrub flora but a greater diversity of perennial herbs. SITE FACTORS: Shallow, rocky soils, typically on hot southern exposures. Depauperate examples of this community frequently are found on roadcuts or similar disturbances. DISTRIBUTION: Inner Coast Ranges from Mount Diablo south to the Cholame Hills, well inland from the coastal fog incursion zone.



DIABLAN SAGE SCRUB

Percent Cover

< 30%

30-49%

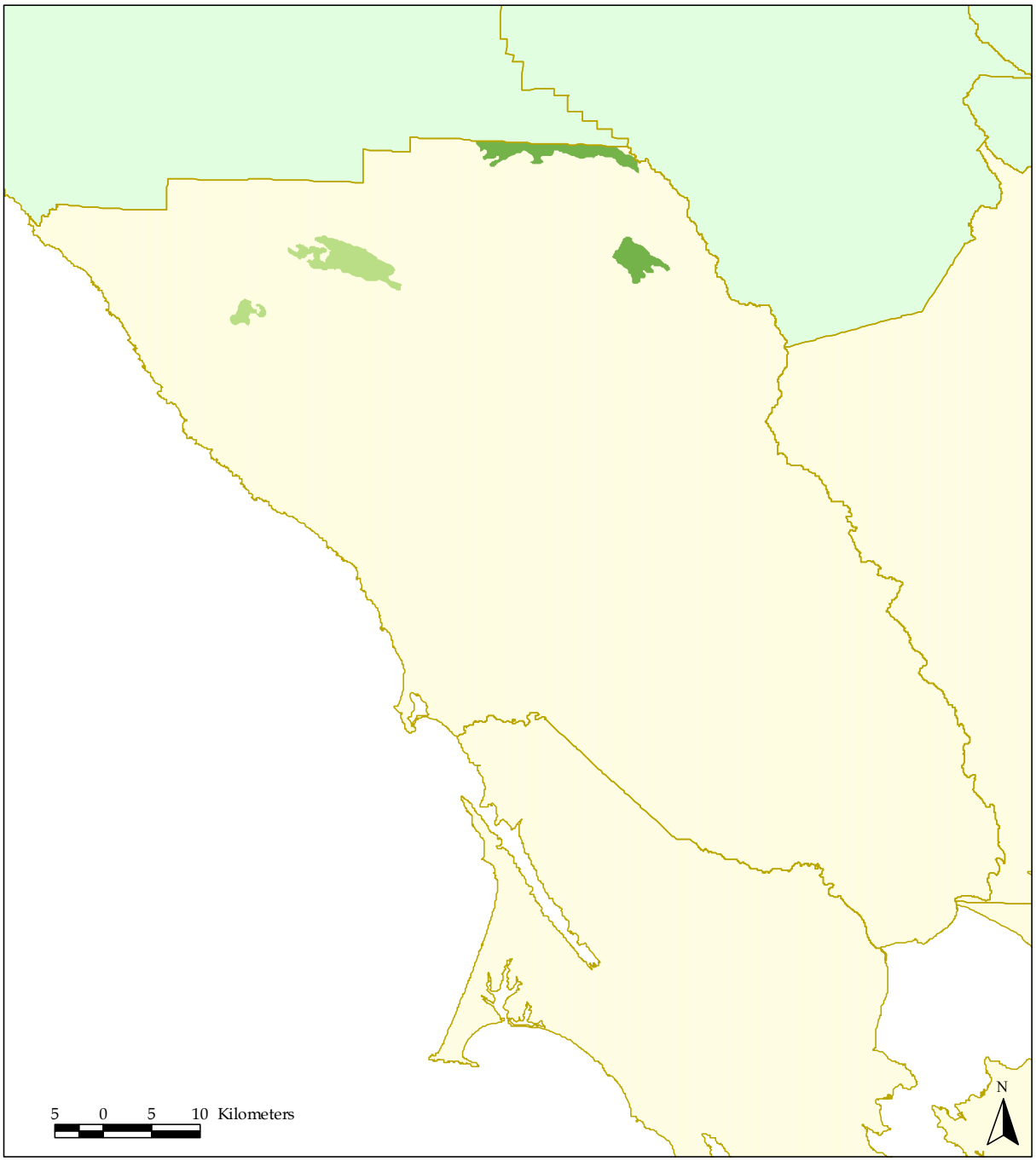
50-69%

> 70%

NORTHERN MIXED CHAPARRAL

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	37110
Km^2 mapped in California	1,652.4
Km^2 mapped in the Bay Area	18.5
Proportion of statewide extent found in the Bay Area	1.1
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	1.1%
Additional area needed to meet protection goal (acres)	863.3
Proportion of California extent in protected status	7.9%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Broad-leaved sclerophyll shrubs, 2-4m tall, forming dense, often nearly impenetrable vegetation dominated by *Quercus berberidifolia, Adenostoma fasciculatum*, and any one of several taxa in *Arctostaphylos* and *Ceanothus*. Plants typically deep-rooted. Usually little or no understory vegetation; often considerable accumulation of leaf litter. Growth may occur throughout the year but is highest in spring and much reduced during the late summer-fall dry season or during the winter at higher elevations. Flowering season extends from late winter to early summer. Adapted to repeated fires, to which many species respond by stump sprouting. A dense cover of annual herbs may appear during the first growing season after a fire, followed in subsequent years by perennial herbs, short-lived shrubs and re-establishment of dominance by the original shrub species. SITE FACTORS: Dry, rocky, often steep slopes with little soil. Slopes are typically south-facing in northern California but north-facing in the south. Often adjacent to, but on rockier soils than Oak Woodland (71100) or Valley and Foothill Grassland (42000), rockier but moister than Venturan Coastal Sage Scrub (32300) or Riversidian Sage Scrub (32700); and warmer, rockier and drier than Broadleaved Upland Forest (81000) or Lower Montane Coniferous Forest (84100). DISTRIBUTION: Interior slopes of the Klamath Mountains and North Coast Ranges, coastal and interior slopes of the South Coast Ranges; western foothills of the Sierra Nevada; Transverse and Peninsular Ranges of southern California on slopes away from the deserts. Generally becoming more abundant from north to south, usually below 3,000 feet (910m) in northern California and 5,000 feet (1520m) in southern California.



NORTHERN MIXED CHAPARRAL

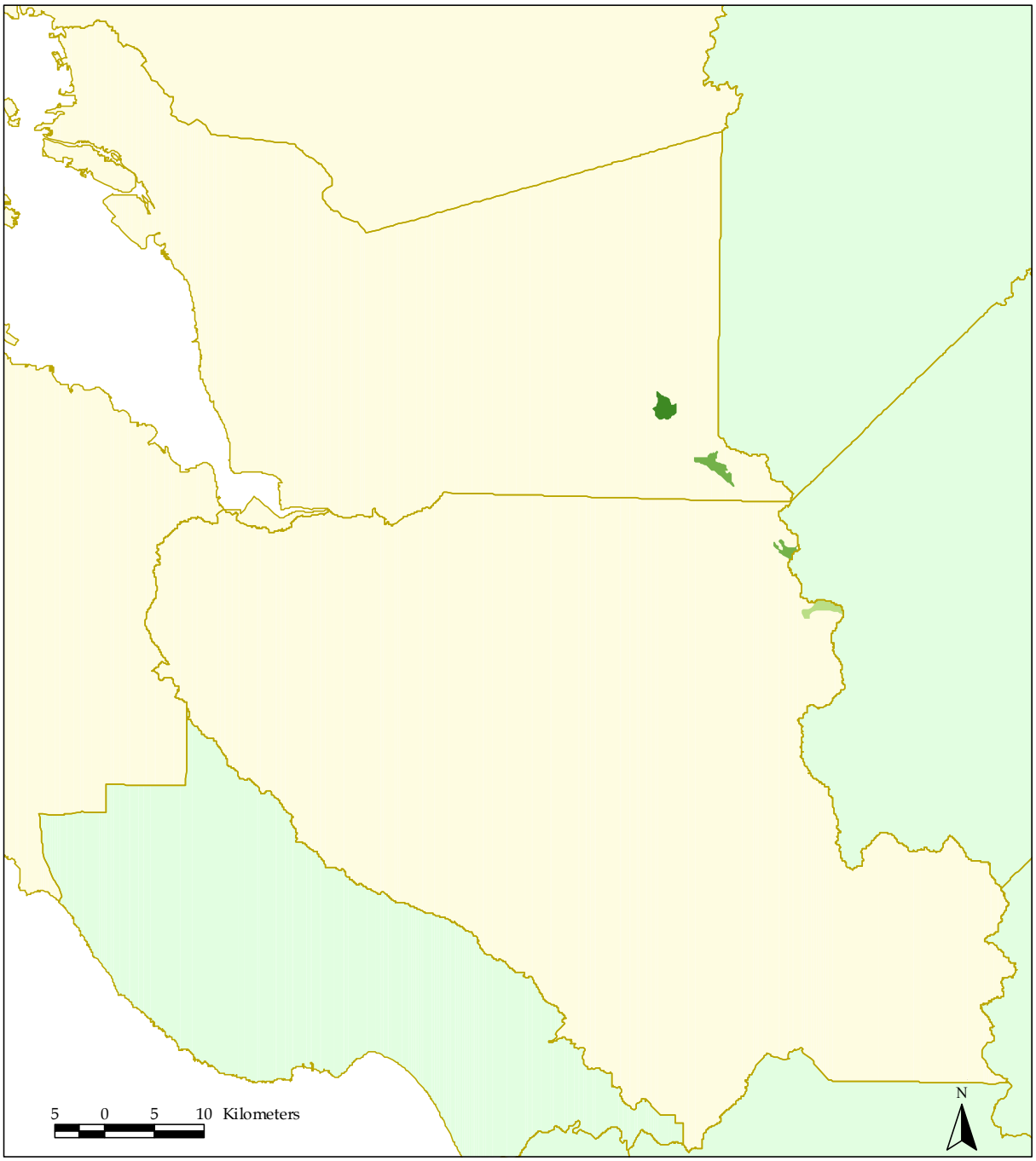
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

LEATHER OAK CHAPARRAL

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	37620
Km^2 mapped in California	98.4
Km^2 mapped in the Bay Area	5.6
Proportion of statewide extent found in the Bay Area	5.7%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	277.1
Proportion of California extent in protected status	18.2%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Adapted from Holland, 1986.	Scrubby sclerophyllous shrublands dominated by any of several shrubs or small conifers that are edaphically restricted to serpentine. Leather Oak Chaparral has a clear dominance by *Quercus durata*. SITE FACTORS: Shallow, stony, infertile soils derived from serpentine. Usually below about 5,000 feet. DISTRIBUTION: Scattered throughout Central and Northern California, wherever serpentine outcrops occur.



LEATHER OAK CHAPARRAL

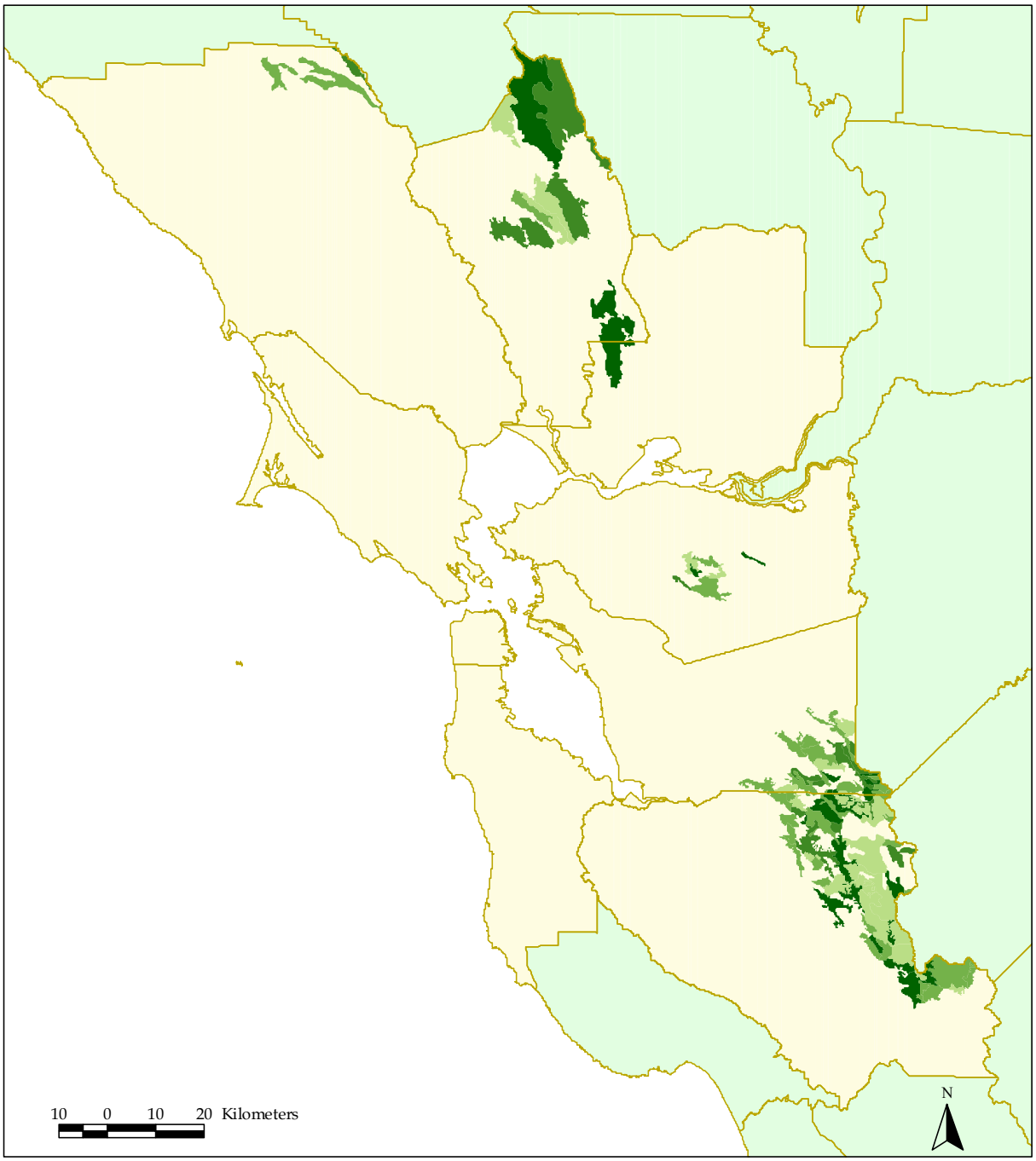
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

FOOTHILL PINE-OAK WOODLAND

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	71410
Km^2 mapped in California	10,180.5
Km^2 mapped in the Bay Area	735.2
Proportion of statewide extent found in the Bay Area	7.2%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	18.3%
Additional area needed to meet protection goal (acres)	3,171.1
Proportion of California extent in protected status	3.2%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	This climax woodland is a mixture of *Pinus sabiniana* and *Quercus douglassii*. Pure stands of either tree do occur, but mixed stands are much more common. *Pinus sabiniana* usually towers over the oaks in undisturbed stands. Understories usually are dominated by introduced annuals. SITE FACTORS: Well-drained sites with Mediterranean climate. Usually in rocky, or exposed sites along ridges or canyons with poor or shallow soils. Intergrades on more mesic sites with Upper Sonoran Mixed Chaparral (37100) or scrubby, dense stands of Blue Oak Woodland (71140). Frequent fire favors blue oak over foothill pine. DISTRIBUTION: Forming a nearly continuous belt around the Central Valley, between Valley and Foothill Grassland (42000) and Lower Montane Mixed Conifer Forest (84000) except for a gap in Tulare County where *Pinus sabiniana* does not occur.



FOOTHILL PINE-OAK WOODLAND

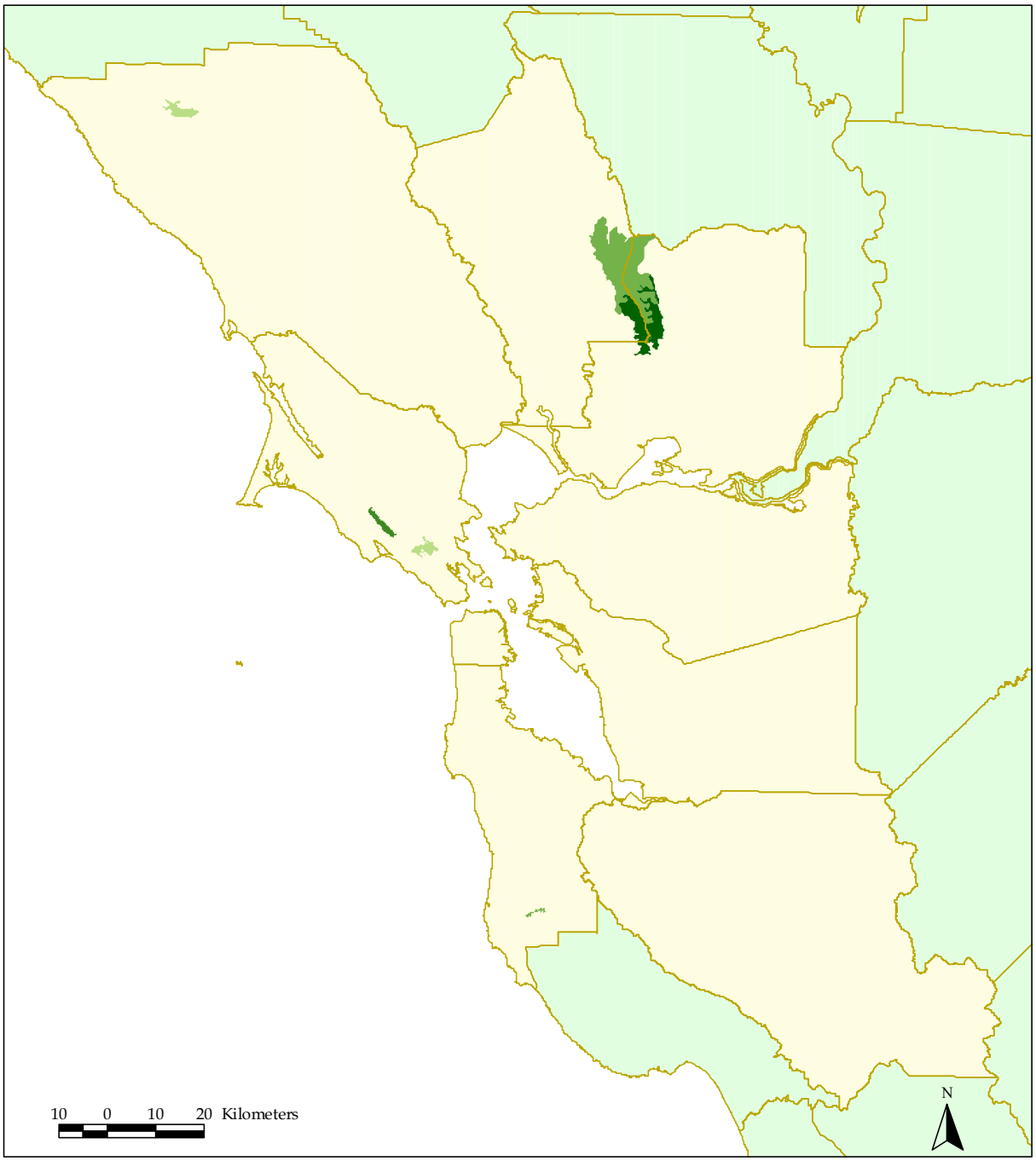
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

INTERIOR LIVE OAK FOREST

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	81330
Km^2 mapped in California	2,708.9
Km^2 mapped in the Bay Area	91.3
Proportion of statewide extent found in the Bay Area	4.5%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	12.8%
Additional area needed to meet protection goal (acres)	2,186.9
Proportion of California extent in protected status	3.4%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A dense, closed-canopy evergreen forest dominated by *Quercus wislizenii*, usually brushy understories. Most pure stands are small and appear to be seral stages of Oak Woodland (71100) with little herbaceous cover. SITE FACTORS: Exceedingly variable; mesic mountainsides in southern California; broad, alluvial river banks in the Sierran foothills; and valley bottoms and foothills in the Coast Ranges. Not a fire type, but *Quercus Wislizenii* is a vigorous stump-sprouter following fire or logging--this often results in even-aged stands. DISTRIBUTION: Sierran foothills and North Coast Ranges just below the Montane Forest; more disjunctly scattered in the South Coast and Transverse Ranges. Below about 2,000 feet in the north, above about 6,000 feet in the south.



INTERIOR LIVE OAK FOREST

Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

BLACK OAK FOREST

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	81340
Km^2 mapped in California	5,614.9
Km^2 mapped in the Bay Area	282.8
Proportion of statewide extent found in the Bay Area	5.0%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	6.6%
Additional area needed to meet protection goal (acres)	9,367.4
Proportion of California extent in protected status	7.9%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A persistent subclimax forest dominated by *Quercus kelloggii*, with scattered emergent *Pinus ponderosa* (except in poorest sites). Most stands are even-aged, reflecting past disturbances. SITE FACTORS: An obvious fire type, *Quercus kelloggii* requires disturbance to hold its own outside its core zone. Occurs on mountain slopes, benches and coves, canyon bottoms, lower sidehills and upper foothill slopes. DISTRIBUTION: Best developed and most extensive in southern Cascade and Klamath Mountains and in northern parts of the Coast Ranges and Sierra Nevada, mostly between 1,500-3,000 feet. Found elsewhere in the Sierra Nevada, South Coast, and Transverse Ranges as low as 200 and as high as 8,000 feet.

BLACK OAK FOREST

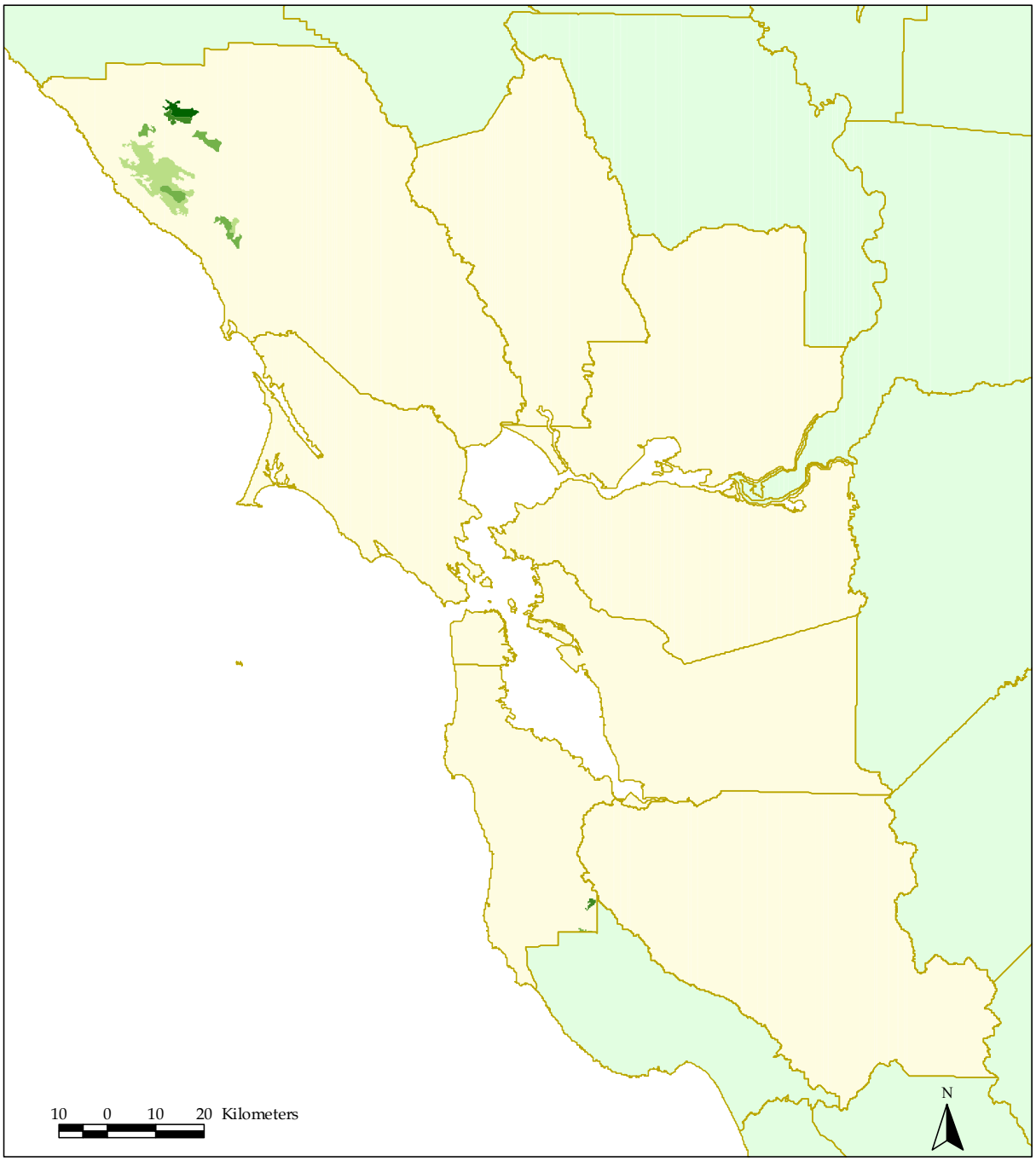
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

TAN OAK FOREST

Combined Priority Score:	**4**
Natural Community Code (Holland, 1986)	81400
Km² mapped in California	1,824.7
Km² mapped in the Bay Area	51.4
Proportion of statewide extent found in the Bay Area	2.8%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	3.2%
Additional area needed to meet protection goal (acres)	2,135.4
Proportion of California extent in protected status	7.1%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A dense-canopied forest of evergreen sclerophyll trees, dominated by *Lithocarpus densiflorus* and *Arbutus menziesii*. SITE FACTORS: Usually a seral stage in Mixed Evergreen Forest (81100) or as an edaphic disclimax on xeric, rocky sites. This forest often occurs around the margins of stands of Redwood Forest (82300) or Douglas Fir Forest (82400). DISTRIBUTION: Klamath and North Coast Ranges; also scattered south even to the Transverse Ranges of southern California.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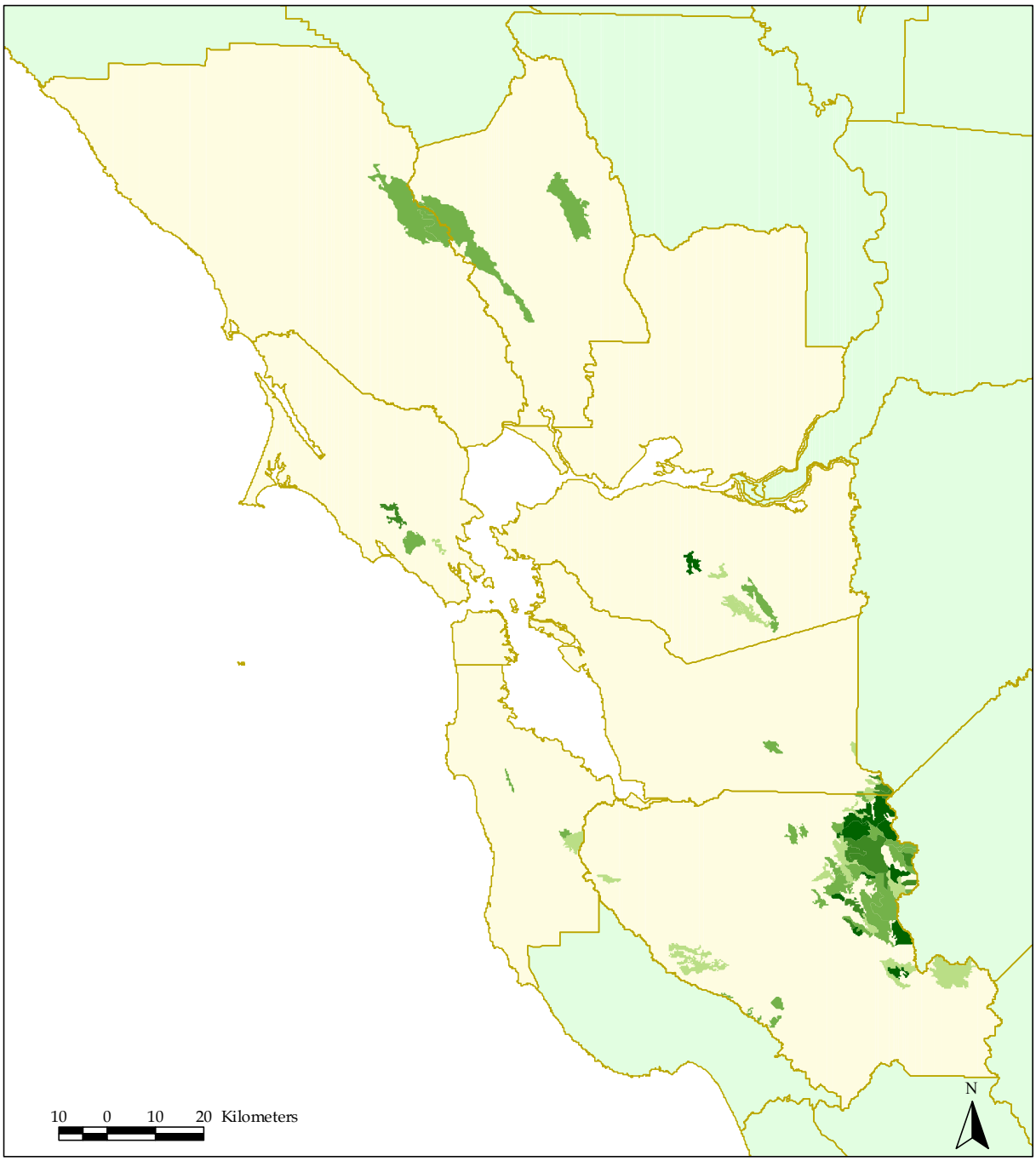
TAN OAK FOREST
Percent Cover
< 30%
30-49%
50-69%
> 70%

BUCK BRUSH CHAPARRAL

Combined Priority Score:	**3**
Natural Community Code (Holland, 1986)	37810
Km² mapped in California	4,196.3
Km² mapped in the Bay Area	348.0
Proportion of statewide extent found in the Bay Area	8.3%
Preliminary Target Protection Level (as% of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	17.9%
Additional area needed to meet protection goal (acres)	1,801.9
Proportion of California extent in protected status	17.5%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A dense chaparral to 3m tall, clearly dominated by *Ceanothus cuneatus* with some admixture of *Adenostoma fasciculatum*. Cover is higher than in Chamise Chaparral (37200) but is not so dense because the branches are not so interwoven. SITE FACTORS: Dry slopes and alluvial fans, usually below 6,000 feet. This may be a climax chaparral in parts of its range, but it clearly is seral to some deciduous oak woodlands (71110-71140) or Lower Montane Coniferous Forests (84000) at many sites. DISTRIBUTION: Widely distributed from southwestern Oregon to northern Baja California, especially in the north where it appears to replace Chamise Chaparral (37200).



BUCK BRUSH CHAPARRAL

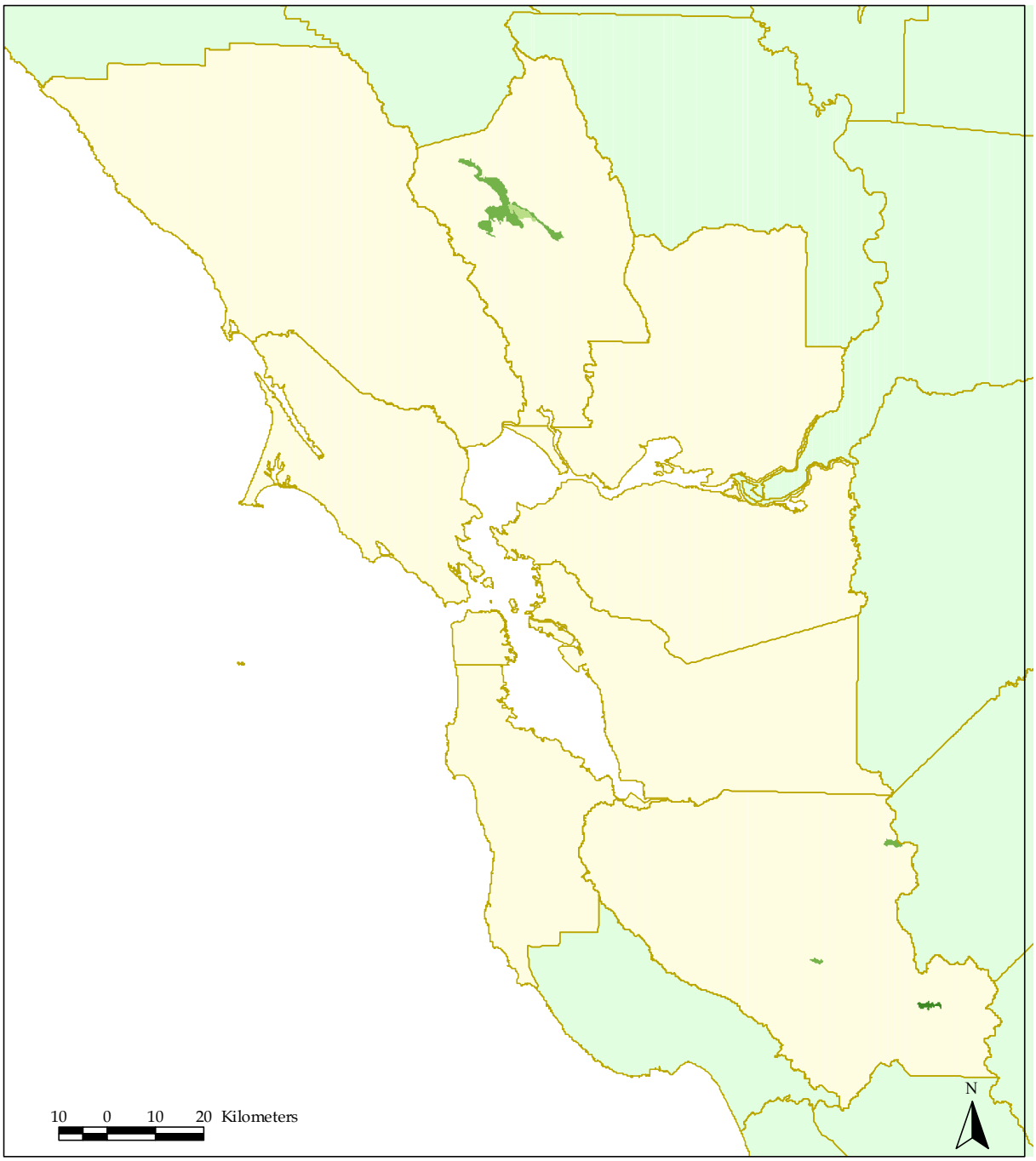
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

OPEN FOOTHILL PINE WOODLAND

Combined Priority Score:	**3**
Natural Community Code (Holland, 1986)	71310
Km^2 mapped in California	1,495.8
Km^2 mapped in the Bay Area	26.5
Proportion of statewide extent found in the Bay Area	1.8%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	9.0%
Additional area needed to meet protection goal (acres)	717.7
Proportion of California extent in protected status	10.8%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	An open, savanna-like woodland dominated by *Pinus sabiniana*. Stocking density and canopy closure are quite variable in this climax type. Understories are typically annual-dominated. SITE FACTORS: Well-drained (but not necessarily deep) soils, generally below 4,000 feet. Intergrades at lower elevations with Blue Oak Woodland (71140); with Upper Sonoran Mixed Chaparral (37100), Black Oak Woodland (71120), or Oregon Oak Woodland (71110) at higher elevations or more mesic sites. Frequent fire favors blue oak over foothill pine. DISTRIBUTION: Essentially surrounds the Central Valley from the Pit River drainage south to Ventura and Santa Barbara counties except for a hiatus in Tulare County.



OPEN FOOTHILL PINE WOODLAND

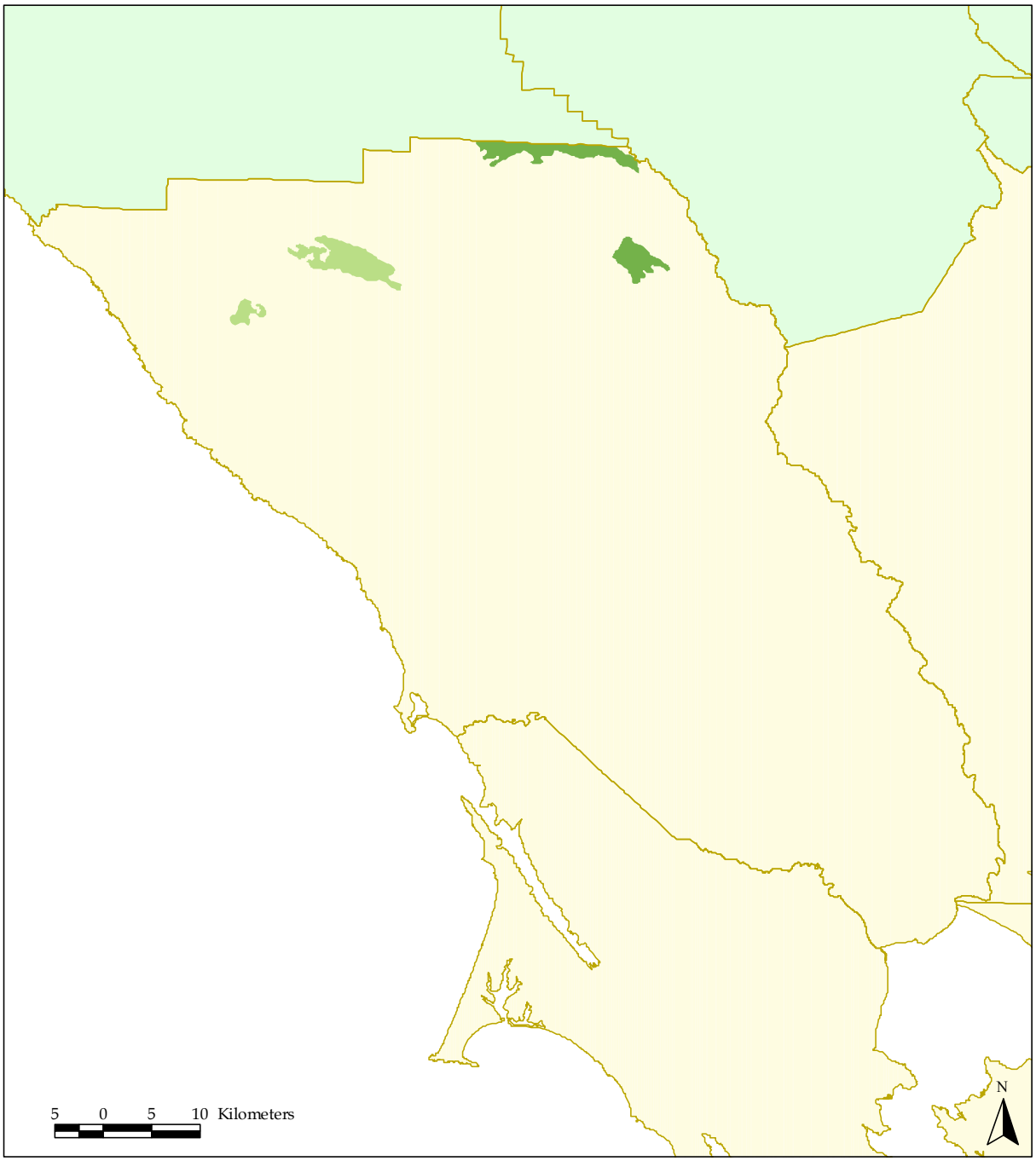
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

ALLUVIAL REDWOOD FOREST

Combined Priority Score:	**3**
Natural Community Code (Holland, 1986)	82310
Km^2 mapped in California	742
Km^2 mapped in the Bay Area	31.6
Proportion of statewide extent found in the Bay Area	4.3%
Preliminary Target Protection Level (as % of Bay Area extent)	100%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	7,796.8
Proportion of California extent in protected status	4.9%
Statewide Status	not ranked
Local Development Risk Score	1

Community Description Source: Holland, 1986	Moderately dense forest dominated by *Sequoia sempervirens*, usually around 80m but occasionally over 100m tall. The tallest forest type in California and one of the tallest in the world. Similar to Western Hemlock Forest (82200) but not quite so dense and less diverse. The understory often consists largely of *Polystichum munitum* and *Oxalis oregana*. The growing season is almost year-round, with a maximum from late spring to early summer. SITE FACTORS: On alluvial flats with deep, well-drained soils. Subject to frequent fogs in summer, periodic flooding in winter and infrequent, sometimes devastating fires. Intergrades with Western Hemlock Forest (82200) or Sitka Spruce-Grand Fir Forest (82100) in moister or more coastal localities and with Upland Redwood Forest (82320) in drier localities with shallower soil. DISTRIBUTION: Primarily in Del Norte and Humboldt counties away from the immediate coast, on the flood plains and lower drainages of Redwood Creek and the Smith, Klamath, Mad, Van Duzen and Eel Rivers. Also on the Russian River in Sonoma Co. and scattered localities to the south.



ALLUVIAL REDWOOD FOREST

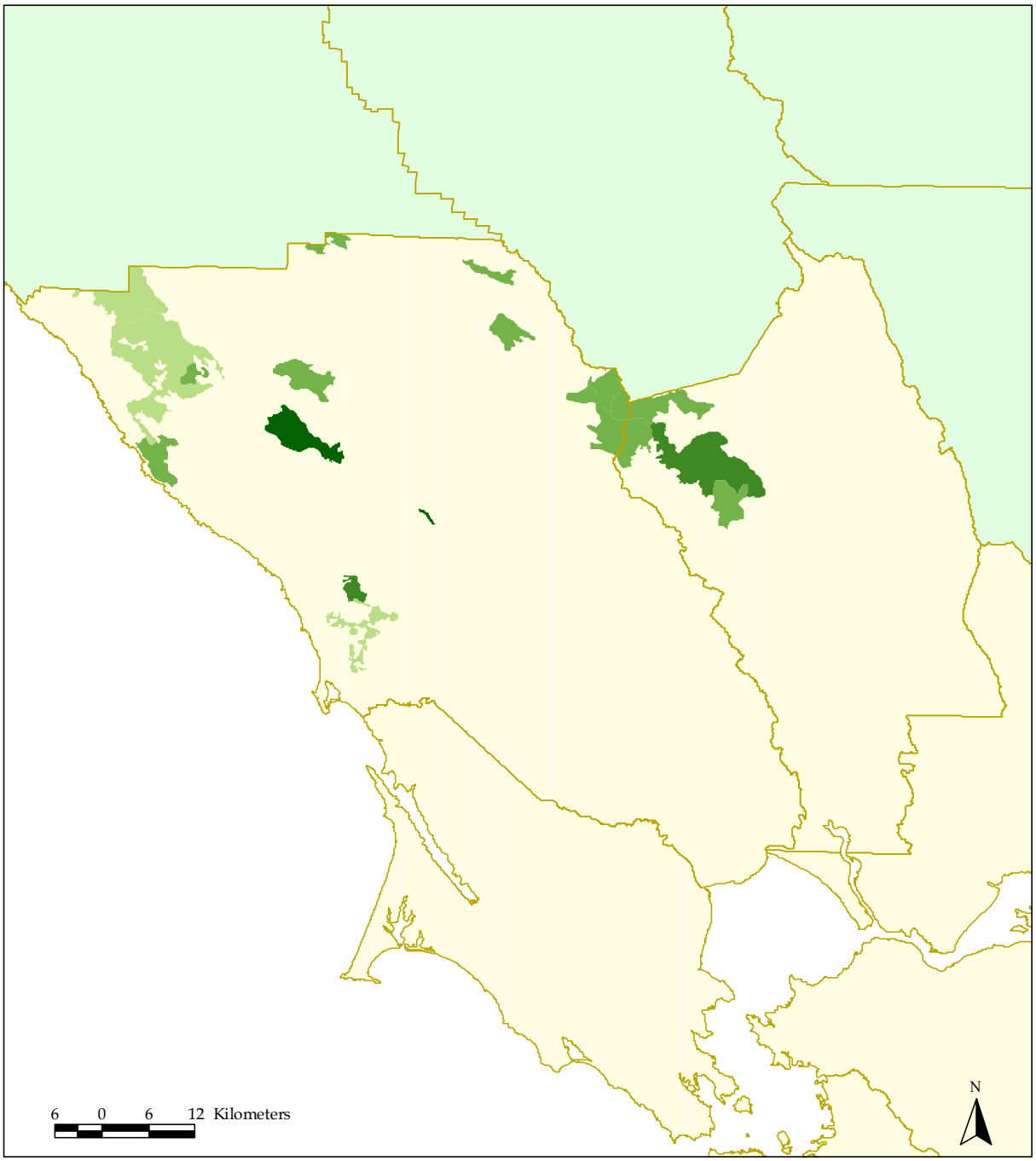
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COAST RANGE MIXED CONIFEROUS FOREST

Combined Priority Score:	**3**
Natural Community Code (Holland, 1986)	84110
Km² mapped in California	13,539.2
Km² mapped in the Bay Area	219.8
Proportion of statewide extent found in the Bay Area	1.6%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	11.0%
Additional area needed to meet protection goal (acres)	4,901.7
Proportion of California extent in protected status	14.7%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	An essentially closed forest to 150-200 feet tall, dominated by *Pinus ponderosa* and *Pseudotsuga menziesii*, in varying proportions, together with *Pinus lambertiana*, *Calocedrus decurrens*, and several broadleaved trees. There is very little *Abies concolor*. Stands usually are uneven aged, with upper canopies dominated by *Pinus ponderosa*. Understories usually are sparse. Most growth occurs in late spring and early summer. SITE FACTORS: Primarily found on mesic sites (north and east aspects, canyons, etc.) in California, usually on well-drained, coarse but relatively moist soils, sometimes occurring on serpentine. Transitional between Mixed Evergreen Forest (81100) and Sierran Mixed Conifer Forest (84230), usually at higher elevations with a more severe climate than the former and at lower elevations with a milder climate than the latter. May also intergrade with Douglas Fir Forest (82400), Knobcone Pine Forest (83210), Santa Lucia Fir Forest (84120), Coulter Pine Forest (84140) or Coast Range Ponderosa Pine Forest (84130). DISTRIBUTION: Klamath and North Coast Ranges from southwestern Oregon to Sonoma and Napa counties, thence scattered southward on summits of the Santa Lucia Mountains in Monterey County. Elevations from 2,000-4,000 feet in the north, 3,500-6,000 feet in the south.



COAST RANGE MIXED CONIFEROUS FOREST

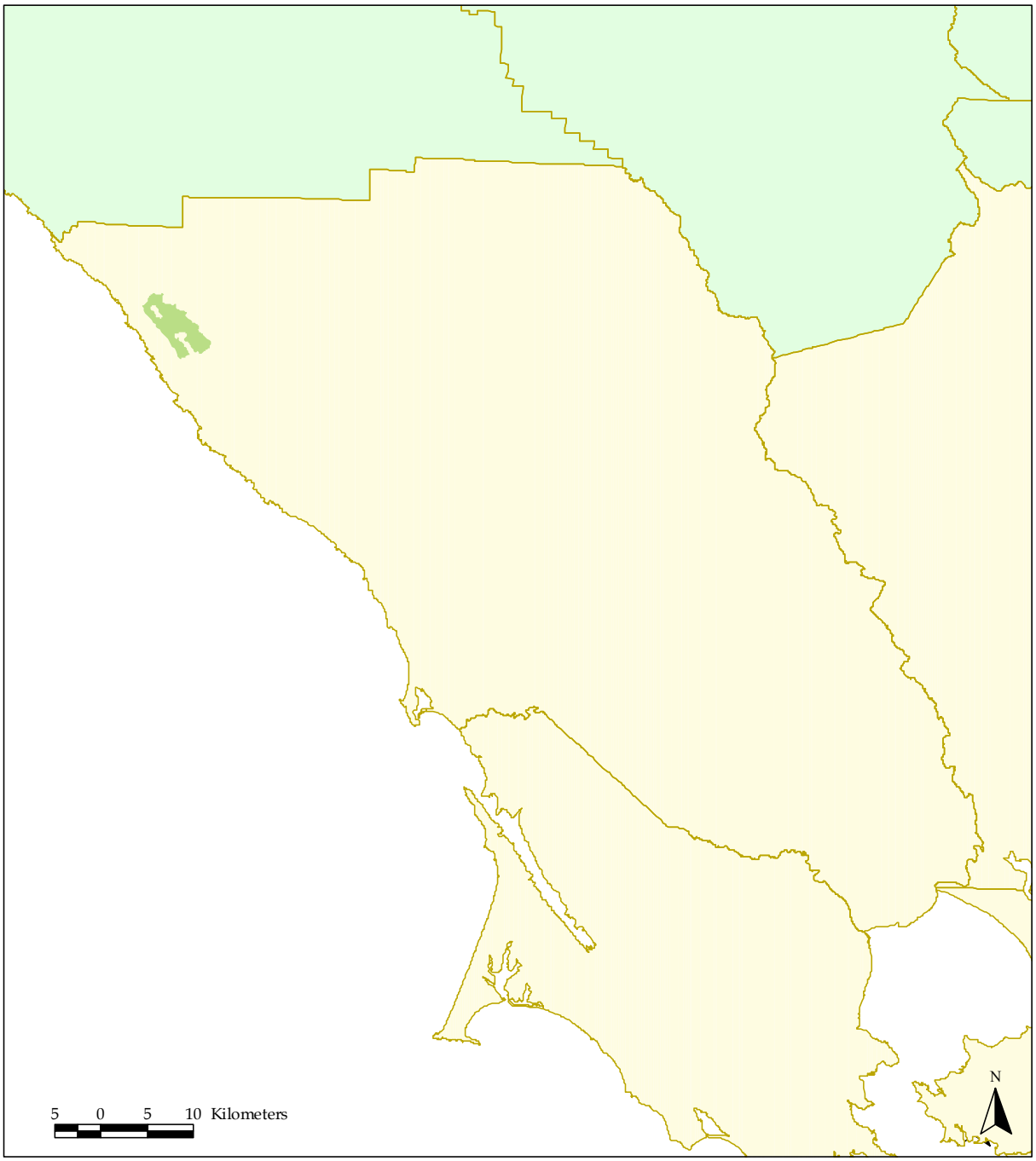
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MONTANE CEANOTHUS CHAPARRAL

Combined Priority Score:	**3**
Natural Community Code (Holland, 1986)	37530
Km² mapped in California	1,083.6
Km² mapped in the Bay Area	2.1
Proportion of statewide extent found in the Bay Area	0.2%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0
Additional area needed to meet protection goal (acres)	105.7
Proportion of California extent in protected status	13.4%
Statewide Status	S4/S3.3
Local Development Risk Score	3

Community Description Source: Holland, 1986	Dense, 1-3m tall mostly sclerophyllous chaparral dominated by any of several species of *Ceanothus*. Plants winter-dormant, most active in late spring and early summer. These stands are taller (to 10 feet) and much denser than other Montane Chaparrals. At least three types are recognized based on the dormant species: 37531-Deer Brush Chaparral (*C. intergerimus*); 37532-Whitethorn Chaparral (*C. leucodermis*); and 37533 Tobacco Brush Chaparral (*C. velutinus*). SITE FACTORS: Similar to and often intergrading with Upper Sonoran Mixed Chaparral (37100), but generally higher (therefore cooler and moister). Most stands are successional after fire, landslide, gold mining, or other catastrophic disturbances. Best developed on dry, exposed sites. DISTRIBUTION: Scattered widely in the lower elevation conifer zones (5,000-8,000 feet) throughout California.



MONTANE CEANOTHUS CHAPARRAL

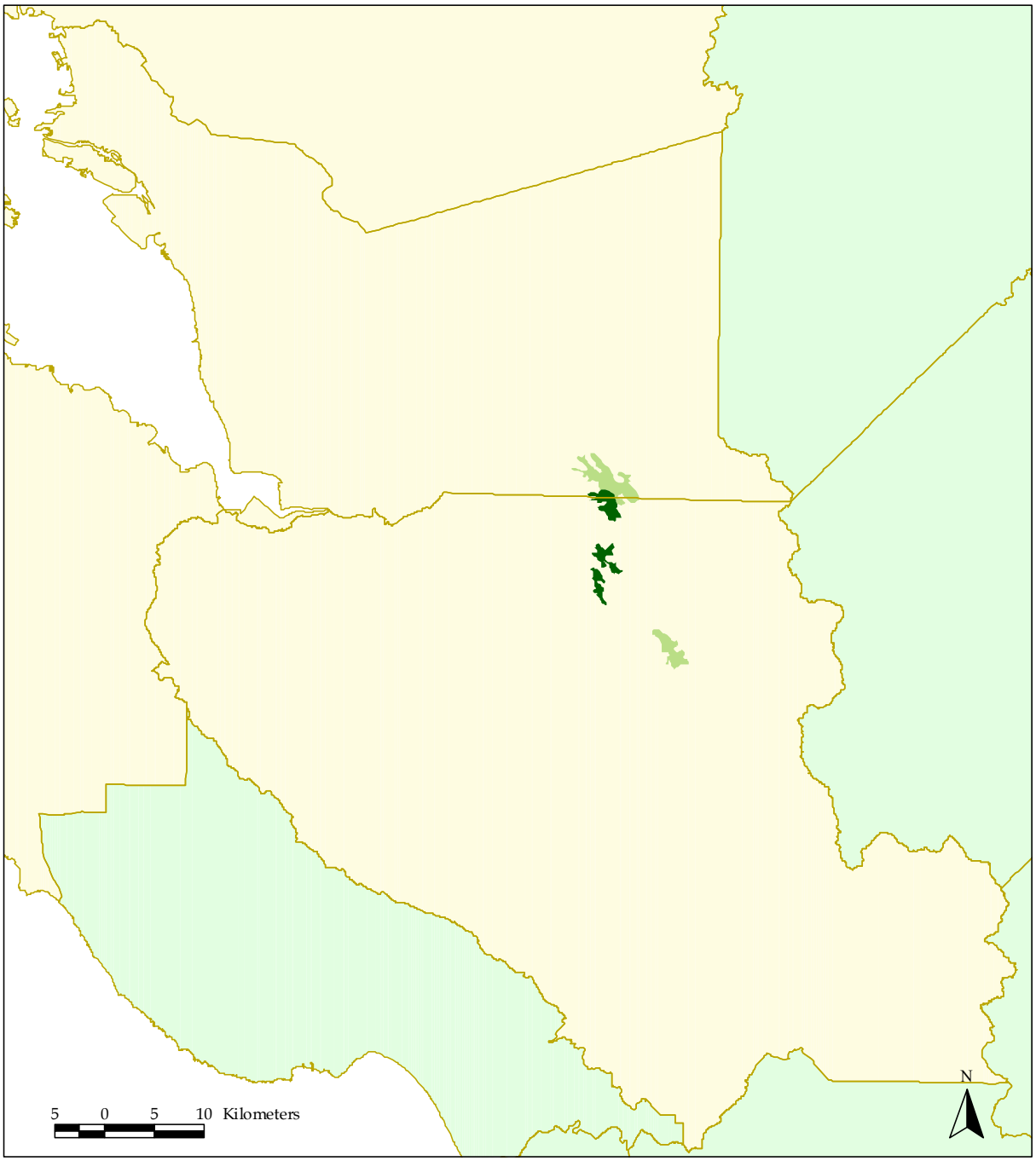
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

COULTER PINE FOREST

Combined Priority Score:	**1**
Natural Community Code (Holland, 1986)	84140
Km² mapped in California	405.2
Km² mapped in the Bay Area	11.3
Proportion of statewide extent found in the Bay Area	2.8%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	1.3%
Additional area needed to meet protection goal (acres)	522.8
Proportion of California extent in protected status	20.5%
Statewide Status	S3.2 (somewhat common, threatened)
Local Development Risk Score	1

Community Description Source: Holland, 1986	An open forest (or more accurately, woodland) of scattered *Pinus coulteri* and *Quercus kelloggii* over shrubs typically associated with Upper Sonoran Mixed Chaparral (37100). Some stands are dense enough to suppress the shrubby layer. Most growth occurs in spring and early summer. SITE FACTORS: Typically on dry, rocky soils of slopes and ridges. Most frequent on south-facing slopes, frequently intermixing there with Californian Mixed Chaparral or Lower Montane Chaparral (37510). Subject to fairly frequent fires on these sites. In the Coast Ranges intergrades with Coast Range Mixed Conifer Forest (84110), Coast Range Ponderosa Pine Forest (84130), or Mixed Evergreen Forest (81100) on moist sites; Blue Oak Woodland (71140) on low-elevation, dry sites; Knobcone Pine Forest (83210) on dry, sterile soils. In southern California, frequently merges into Sierran Mixed Conifer Forest (84230) at its upper limits. Fire exclusion may be facilitating conversion of some oak woodlands to Coulter pine stands, as in the Gabilan Range. DISTRIBUTION: Widely scattered, though fragmented, throughout the South Coast Ranges from Contra Costa County south into Baja California. Elevations vary from 2,500-5,000 feet in the north, to 4,000-6,500 feet in the south. Best developed in San Gabriel, San Bernardino, and San Jacinto mountains.



COULTER PINE FOREST

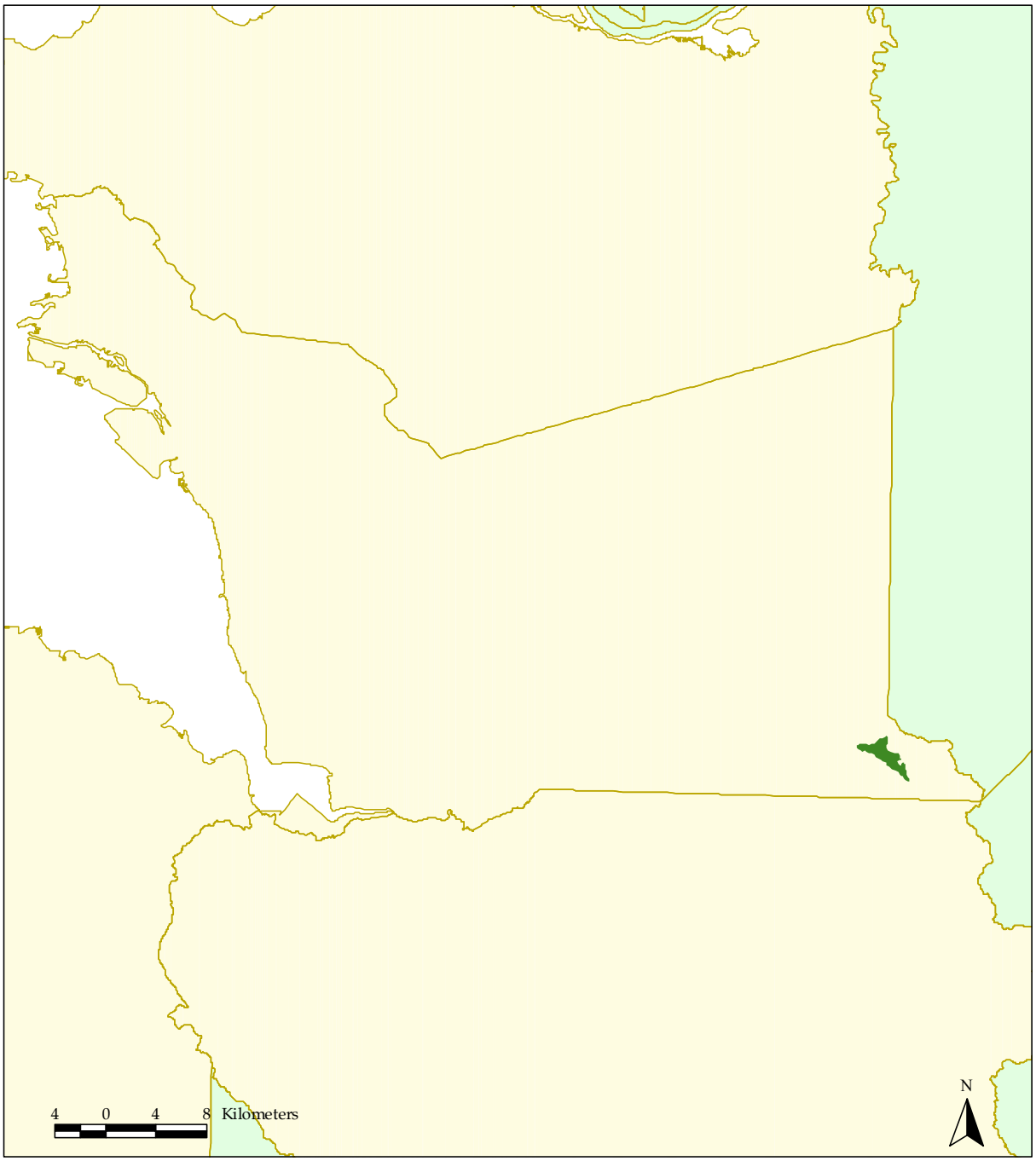
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

MIXED MONTANE CHAPARRAL

Combined Priority Score:	**0**
Natural Community Code (Holland, 1986)	37510
Km^2 mapped in California	1852.0
Km^2 mapped in the Bay Area	2.5
Proportion of statewide extent found in the Bay Area	0.1%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	0%
Additional area needed to meet protection goal (acres)	122.1
Proportion of California extent in protected status	26.4%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A dense, heterogeneous, sclerophyllous thicket dominated by *Ceanothus cordulatus, Chrysolepis sempervirens*, and any of several species of *Arctostaphylos* or *Ceanothus*. Understories typically are very sparse except in the few years immediately following fire. Most plants are under 5 feet tall. Canopies usually are not quite closed. SITE FACTORS: Steep, usually south-facing slopes in the coniferous forest zones. Much of the annual precipitation comes as snow, leading to shorter growing seasons (and hence, slower post-fire recovery) than in lower elevation chaparrals. Some of these sites appear to be edaphic disclimaxes (due to shallow, rocky soil) rather than seral stages such as in many Montane Ceanothus Chaparrals (37530). DISTRIBUTION: Widely scattered in the Sierran foothills, the cooler heights of the Coast Ranges and the Transverse and Peninsular ranges of southern California, typically between 4,000 and 11,000 feet.



MIXED MONTANE CHAPARRAL

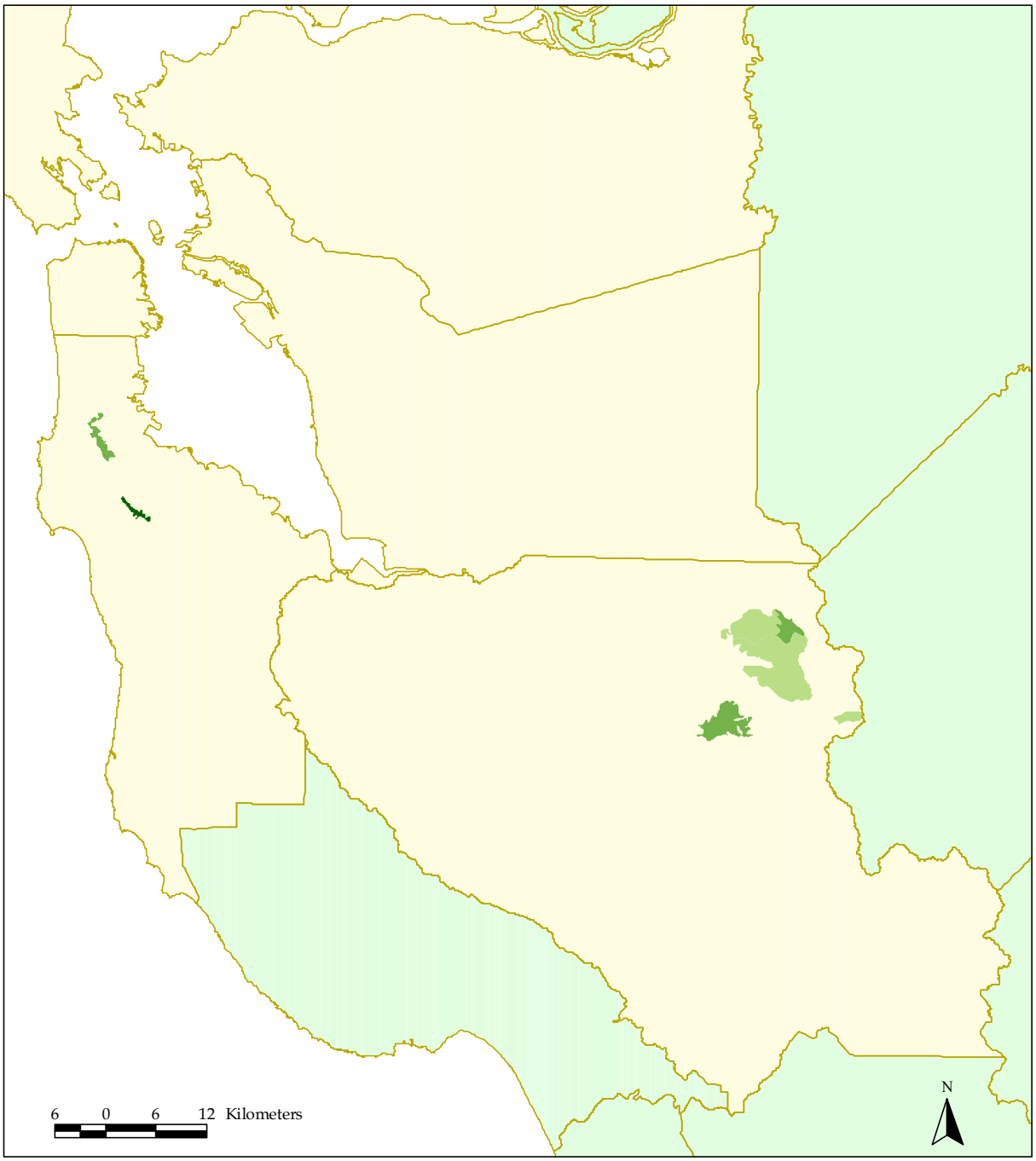
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

SCRUB OAK CHAPARRAL

Combined Priority Score:	**0**
Natural Community Code (Holland, 1986)	37900
Km² mapped in California	2162.0
Km² mapped in the Bay Area	22.3
Proportion of statewide extent found in the Bay Area	1.0%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	17.7%
Additional area needed to meet protection goal (acres)	126.3
Proportion of California extent in protected status	23.4%
Statewide Status	S3.3 (somewhat common, no known threats)
Local Development Risk Score	1

Community Description Source: Holland, 1986	A dense, evergreen chaparral to 20 feet tall, dominated by *Quercus berberidifolia* with considerable *Cercocarpus betuloides*. SITE FACTORS: Somewhat more mesic than many chaparrals, and often occurring at slightly higher elevations (to 5,000 feet). These more favorable sites recover form fire more quickly than other chaparrals. Substantial leaf litter accumulates. DISTRIBUTION: Western Sierran foothills and North Coast ranges from Tehama County south through the southern California mountains to Baja California.



SCRUB OAK CHAPARRAL

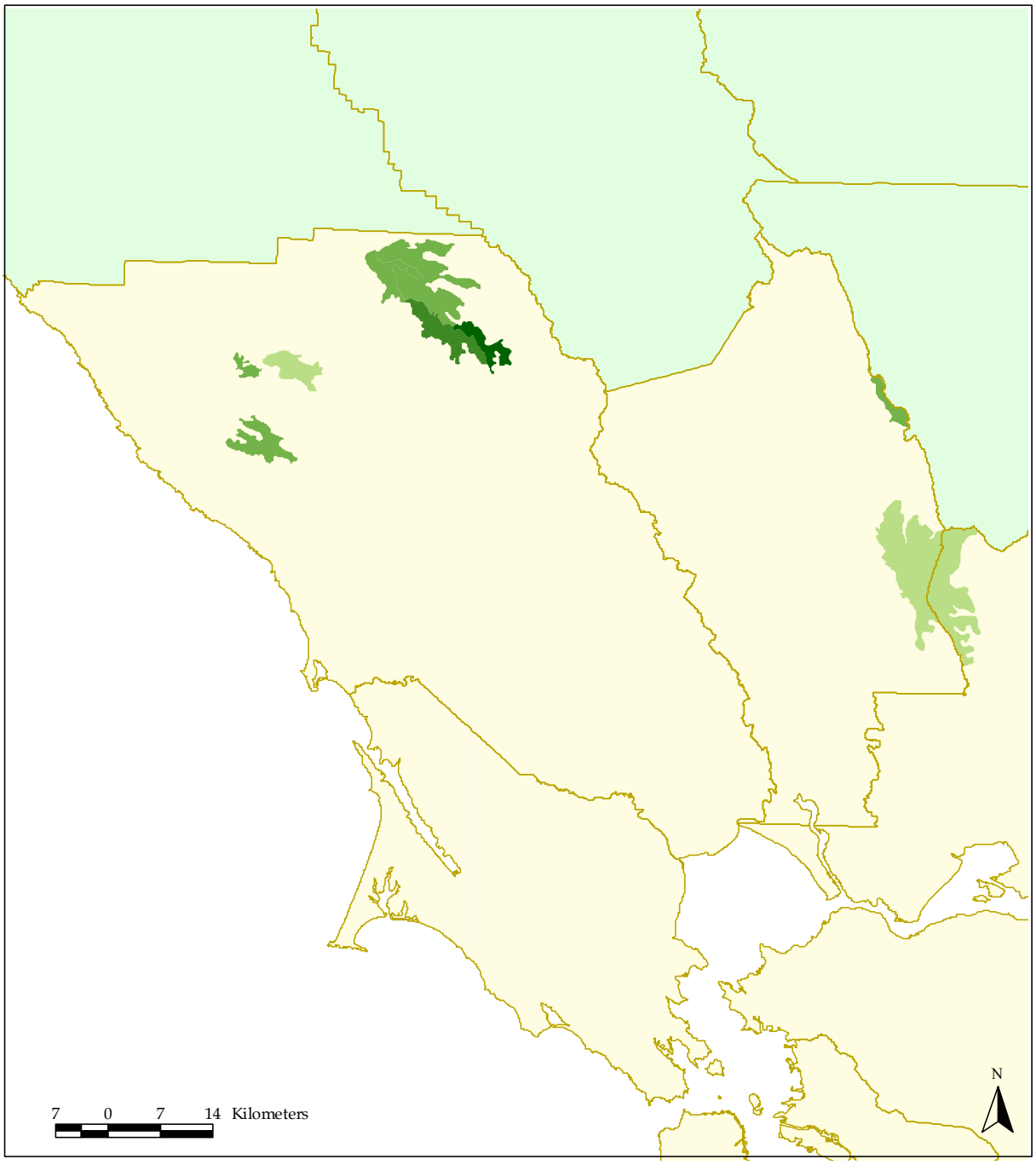
Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

CANYON LIVE OAK FOREST

Combined Priority Score:	**0**
Natural Community Code (Holland, 1986)	81320
Km² mapped in California	1,736.2
Km² mapped in the Bay Area	113.1
Proportion of statewide extent found in the Bay Area	6.5%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	2.2%
Additional area needed to meet protection goal (acres)	4,978.4
Proportion of California extent in protected status	21.8%
Statewide Status	S4 (common, secure)
Local Development Risk Score	1

Community Description Source: Holland, 1986	Similar to Coast Live Oak Forest (81310), but usually denser and not so tall. Dominated by *Quercus chrysolepis*, a broadleaved sclerophyll. Typically forms forests with little understory up to 20m tall in canyons of on north-facing slopes, and low, chaparral-like stands less than 10m tall on south-facing slopes. Trees often with multiple trunks, probably from crown-sprouting after fires. Growing season from late spring into summer, similar to that of Lower Montane Coniferous Forests (84000). SITE FACTORS: Transitional between low elevation broadleaved forests and higher elevation coniferous forests. On rocky, often steep slopes with little soil development. Typically in canyons and on north-facing slopes at relatively low elevations and on south-facing slopes at higher elevations. At higher elevations with colder winters than Mixed Evergreen Forest (81100), Blue Oak Woodland (71140), Coast Live Oak Forest (81310), or Californian Mixed Chaparral (37110). Often adjacent to Montane Chaparral (37500) on dry slopes or lower Montane Coniferous Forest (84000) on less rocky soils. May intergrade with any of the above vegetation types and is not always distinct from them. DISTRIBUTION: Inner North Coast Ranges from Siskiyou Co. to Lake Co., South Coast Ranges from Mount Diablo to Monterey Co. West slope of the Sierra Nevada from Tehama Co. to Kern Co. at elevations of 1,000-4,000 feet in the north and 3,000-6,000 feet in the south. Replaced by the closely related Bigcone Spruce-Canyon Oak Forest (84150) in the Transverse and Peninsular Ranges of southern California.



CANYON LIVE OAK FOREST

Percent Cover

< 30%

30-49%

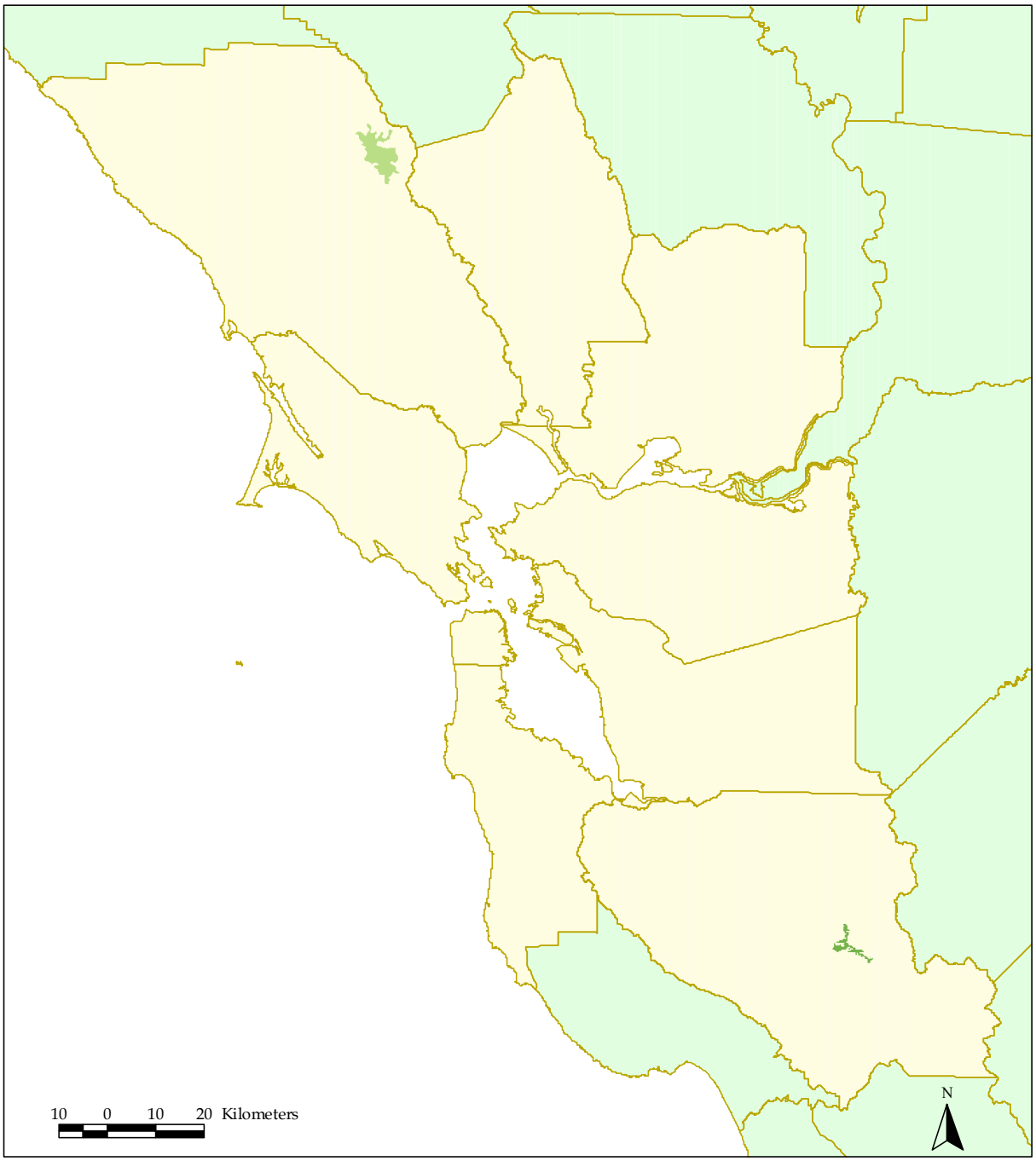
50-69%

> 70%

COAST RANGE PONDEROSA PINE FOREST

Combined Priority Score:	**-1 to 3**
Natural Community Code (Holland, 1986)	84130
Km² mapped in California	468.9
Km² mapped in Bay Area	8.6
Proportion of statewide extent found in the Bay Area	1.8%
Preliminary Target Protection Level (as % of Bay Area extent)	20%
Current proportion of Bay Area extent in protected status	12.6%
Additional area needed to meet protection goal (acres)	158.8
Proportion of California extent in protected status	22.8%
Statewide Status	S1.1-S3.2 (regionally, very rare, very threatened to somewhat common, threatened)
Local Development Risk Score	-2

Community Description Source: Adapted from Holland, 1986.	These open, tall, park-like forests dominated by *Pinus ponderosa* may reach 200 feet. Other conifers or hardwoods may be present in small amounts. Frequent ground fires fueled by abundant litter accumulations keep the understory fairly open in this climax type. Two types are recognized: (84131) - Upland Coast Range Ponderosa Pine Forest and (84132) - Maritime Coast Range Ponderosa Pine Forest. The maritime type can also occur as a denser stand of P. ponderosa together with *Quercus agrifolia* and (sometimes) *P. attenuata*, with an understory of sometimes impenetrable shrubs. SITE FACTORS: Typically on well-drained, relatively dry soils of slopes and ridges. Best developed on gently sloping ridges and uplands. Very similar to Sierran "Westside" Ponderosa Pine Forest (84210) but probably moister and with milder temperatures. Doubtfully distinct from and intergrading with this forest in higher, drier localities of the Klamath Mountains and North Coast Ranges. Also intergrades with Mixed Evergreen Forest (81100) or Douglas Fir Forest (82400) in low-elevation, moist sites, with Oak Woodlands (71000) in low-elevation, dry sites and with Coast Range Mixed Conifer Forest (84110) in high-elevation, moist sites. The maritime type is restricted to sterile marine sand deposits within the summer coastal fog incursion zone. Fire is implicated in maintaining the open quality of the understory. DISTRIBUTION: Klamath Mountains and inner North Coast Ranges south to northwestern Napa Co. Hamilton Range, Santa Clara Co. Common on the higher ridges of the Santa Lucia Mountains in Monterey and northernmost San Luis Obispo Co. Elevation from 1,500-3,500 feet (460-1360m) in the north and from 2,500-4,500 feet (760-1520m) in the south. The Maritime type is narrowly restricted to Santa Margarita Formation exposures in coastal Santa Cruz County (Scotts Valley-Ben Lomond and Bonny Doon areas).



COAST RANGE PONDEROSA PINE FOREST

Percent Cover

- < 30%
- 30-49%
- 50-69%
- > 70%

Appendix 2
Flow Chart of Stewardship Classification Decision Rules
Developed by the National Gap Analysis Program

A-1 If the management intent can be determined through agency or institution documentation go to A-2.	**B-1** If the total system in the land unit is conserved for natural ecological function with no more than 5% of the land unit in anthropogenic use, go to B-4; if conservation provisions apply only to selected features of species, go to B-2.
A-2 If the land unit is subject to statutory or legally enforceable protection from conversion to anthropogenic use of all or selected biological features by state or federal legislation, regulation, private deed restriction or conservation easement intended for permanent status, go to B-1. If not go to A-3.	**B-2** If management emphasizes natural processes including allowing or mimicking natural ecologic disturbance events, but also allows low anthropogenic disturbance, renewable resource use, or high levels of human visitation on more than 5% of the land unit-**Status 2**; if not, go to B-3.
A-3 If ecological protection is not legally enforceable, temporary or lacking but managed by a plan intended for permanent status go to A-4. If not go to A-5.	**B-3** Management allows intensive, anthropogenic disturbance such as resource extraction, military exercises, or developed or motorized recreation on more than 5% of the land unit, but included ecological management for select features- **Status 3**.
A-4 Management to benefit biological diversity is provided by a written plan in place or in process under an institutional policy requiring such management – **Status 3.**	**B-4** If management strives for natural processes including allowing or mimicking natural ecological disturbance events – **Status 1**; if not, go to B-5.
A-5 Not subject to an adopted management plan or regulation that promotes biological diversity or management intent is unknown--**Status 4.**	**B-5** Managed for natural processes, but some or all disturbance events are suppressed or modified—**Status 2**.

Appendix 3
Land Cover and Natural Community Codes and Descriptions Other Than Those Described in the Community Profiles (Appendix 1)
Based on Holland,1986 and other sources

URBAN OR BUILT-UP LAND (11100): Urban or Built-up Land is comprised of areas of intensive use with much of the land covered by structures. Included in this category are cities, transportation, power, and communications facilities, and areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from urban areas. No attempt has been made in the California Gap Analysis Project to distinguish between the various forms of built-up land, because the focus is on native biodiversity.

As development progresses, land having less intensive or nonconforming use may be located in the midst of urban or built-up areas and will generally be included in this category. Agricultural land, forest, wetland, or water areas on the fringe of urban or built-up areas will not be included except where they are surrounded and dominated by urban development. The urban or Built-up category takes precedence over others when the criteria for more than one category are met. For example, residential areas that have sufficient tree cover to meet the criteria for a forest community type will be placed in this category.

DISTRIBUTION: This type occurs throughout California in all regions.

Source: Modified by the California Gap Analysis Project from Anderson et al., 1976.

AGRICULTURAL LAND (11200): Agricultural Land may be defined broadly as land used primarily for production of food and fiber. On satellite imagery, the chief indications of agricultural activity are distinctive geometric field and road patterns on the landscape and the traces produced by livestock or mechanized equipment. However, pasture and other lands where such equipment is used infrequently may not show as well-defined shapes as other areas. The number of building complexes is smaller and the density of the road and highway network is much lower in Agricultural land than in Urban or Built-up Land.

The interface of Agricultural Land with other categories of land use may sometimes be a transition zone in which there is an intermixture of land uses at first and second levels of categorization. Where farming activities are limited by wetness, the exact boundary also may be difficult to locate, and Agricultural Land may grade into Wetland. When the production of agricultural crops is not hindered by wetland conditions, such cropland should be included in the Agricultural category. This latter stipulation also includes those cases in which agricultural crop production depends on wetland conditions, such as the flooding of rice fields or the development of cranberry bogs. When lands produce economic commodities as a function of their wild state such as wild rice, cattails, or

certain forest products commonly associated with wetland, however, they should be included in a Wetland category. Similarly, when wetlands are drained for agricultural purposes, they should be included in the Agricultural Land category. When such drainage enterprises fall in to disuse and if wetland vegetation is reestablished, the land reverts to a Wetland category.

Where more specific agricultural uses are known, the appropriate codes are used (11201-11213). The (11200) type was applied when these uses were not known or where they were too intermixed to separate.

DISTRIBUTION: This type occurs throughout California but is most widespread in and adjacent to the Great Central Valley and to a lesser extent in coastal plains and valleys.

Source: Modified by the California Gap Analysis Project from Anderson et al., 1976.

ROW AND FIELD CROPS (11201): Vegetation in this land-cover type includes a variety of sizes, shapes, and growing patterns. Most are grown in rows and require irrigation. The major row and field crops in California include asparagus, broccoli, carrots, cauliflower, celery, cucumbers, cantaloupes, lettuce, melons, onions, peppers, tomatoes, strawberries, cotton, potatoes, sweet potatoes, and sugar beets.

DISTRIBUTION: Row and field crops are established on the state's most fertile soils on flat to gently rolling terrain. This type occurs throughout California but is most widespread in and adjacent to the Great Central Valley and to a lesser extent in coastal plains and valleys.

Source: Adapted by the California Gap Analysis Project from the California Wildlife Habitat Relationships System (Schultze, 1994).

PASTURE (11206): Pasture vegetation is a mix of irrigated perennial grasses and legumes that normally provide 100 percent canopy closure. The mix of grasses and legumes varies according to management practices such as seed mixture, fertilization, soil type, irrigation, weed control, and the type of livestock on the pasture.

DISTRIBUTION: Pastures are planted on flat to gently rolling terrain. This type occurs throughout California but is most widespread in the Great Central Valley and to a lesser extent in coastal plains and valleys.

Source: Adapted by the California Gap Analysis Project from the California Wildlife Habitat Relationships system (Mayer and Laudenslayer, 1988).

ORCHARDS AND VINEYARDS (11210): Orchards, groves, and vineyards produce various fruit and nut crops. Tree nurseries which provide seedlings for plantation forestry

also are included here. Many of these areas may be included in another category, generally Agricultural Land (11200), when identification is made by use of small-scale imagery alone. Isolated small orchards, such as the fruit trees on the family farms, usually are not recognizable on high-altitude imagery and are, therefore, not included. Where this general type can be identified more specifically from large scale sources, it was labeled as Evergreen Orchard (11211), Deciduous Orchard (11212) or Vineyard (11213).

DISTRIBUTION: Orchards and vineyards can be found on flat alluvial soils in valley floors, in rolling foothill areas, or on relatively steep slopes. Most are irrigated, usually with sprinklers or drip irrigation. This type is most widespread in the Great Central Valley and to a lesser extent in coastal plains and valleys.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

DECIDUOUS ORCHARD (11212): Deciduous orchards in California are typically open, single species tree-dominated habitats, with an open understory. These orchards include apples, almonds, apricots, cherries, figs, nectarines, peaches, pears, pecans, pistachios, plums, pomegranates, prunes, and walnuts. Almonds are by far the most widespread orchard type, followed by walnuts, prunes and peaches.

DISTRIBUTION: Deciduous orchards can be found on flat alluvial soils in valley floors, in rolling foothill areas, or on relatively steep slopes. Most are in valley floors but a few, such as apples and pears, grow at elevations up to 1,000 meters. Most are irrigated, usually with sprinklers or drip irrigation, although some may be flood irrigated. Commercial deciduous orchards are grown in nearly every county in the state except Alpine, Lassen, Modoc, Mono, Plumas, San Francisco, and Trinity. This type is most widespread in the Great Central Valley and to a lesser extent in southern coastal plains and valleys.

Source: Adapted by the California Gap Analysis Project from the California Wildlife Habitat Relationships System (Schultze, 1994).

VINEYARDS (11213): Vineyards are composed of single species planted in rows, usually supported on wood and wire trellises. Rows under the vines are usually sprayed with herbicides to prevent growth of herbaceous plants. Between rows of vines, grasses and other herbaceous plants may be planted or allowed to grow as a cover crop to control erosion. The vast majority of vineyards grow grapes. Other vineyard crops include boysenberries, olallieberries, raspberries, and kiwifruit.

DISTRIBUTION: Vineyards can be found on flat alluvial soils in valley floors, in rolling foothill areas, or on relatively steep slopes. All are irrigated, usually with sprinklers or drip irrigation, although some may be flood irrigated. This type is most widespread in the Great Central Valley and to a lesser extent in coastal plains and valleys.

Source: Adapted by the California Gap Analysis Project from the California Wildlife Habitat Relationships System (Schultze, 1994).

EUCALYPTUS (11300): Eucalyptus groves have been extensively planted throughout the state since their introduction in 1865. Overstory composition is typically limited to one, or sometimes a few, species of the genus; few native overstory species are present within eucalyptus planted areas. The Urban and Built-up Land category takes precedence over eucalyptus when the criteria for more than one category are met. Therefore, most eucalyptus groves are included in type (11100).

DISTRIBUTION: Eucalyptus occurs in California from San Diego and Imperial counties in the south, usually at elevations below 500 m, to Shasta in the north. Most eucalyptus, however, is found around populated areas of southern and central California.

Source: Adapted by the California Gap Analysis Project from Mayer and Laudenslayer, 1988.

MID-ELEVATION CONIFER PLANTATION(11401): Even-aged stands of Ponderosa pine of varying height, but often 5-12 m tall. Canopy is usually open enough to allow sufficient light penetration to support fairly dense to dense shrub growth.

SITE FACTORS: Sites disturbed from previous timber harvest. Soil disturbance from log skidding and transport. Fire, herbicide and tree planting among anthropogenic treatments undertaken to achieve target vegetation and attempt to maximize tree growth.

DISTRIBUTION: Throughout Modoc Plateau region on Forest Service land at elevations ranging mostly from 1500-2500 m. Also in Sierra Nevada, Cascades Ranges, and Northwestern California.

Source: California Gap Analysis Project

STREAMS AND CANALS (11510): The streams and Canals category includes rivers, creeks, canals, and other linear water bodies. Where the water course is interrupted by a control structure, the impounded area will be placed in the Reservoirs category. The boundary between streams and other bodies of water is the straight line across the mouth of the stream up to 1 nautical mile (1.85 km). Beyond that limit, the classification of the water body changes to the appropriate category, whether it be Lakes, Reservoirs, or Bays and Estuaries. These latter categories are used only if the water body is considered to be "inland water" and therefore included in the total area of the United States. No category is applied to waters classified as "other than inland water" or offshore marine waters beyond the mouths of rivers.

DISTRIBUTION: This type occurs throughout California in all regions.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

PERMANENTLY-FLOODED LACUSTRINE HABITAT (11520): Lacustrine habitats are inland depressions or dammed riverine channels containing standing water, including both the near-shore (limnetic) and deepwater habitat (littoral). Using this functional classification from Cowardin et al. 1979 incorporates both the Lakes and Reservoir classes of Anderson et al. 1976. In Cowardin et al.'s classification, each area must exceed 20 acres (~8 hectares) and be deeper than 6.6 feet (~2 meters). For the California GAP, however, only water bodies larger than 40 hectares were mapped. This class is distinguished from Intermittently-flooded lacustrine habitat only by the typical duration of standing water.

DISTRIBUTION: This type occurs throughout California at virtually all elevations and in all regions, although less abundant in arid regions.

Source: Modified by the California Gap Analysis Project from Cowardin et al., 1979 and Mayer and Laudenslayer, 1988.

BAYS AND ESTUARIES (11540): Bays and Estuaries are inlets or arms of the sea that extend inland. They are included in this system only when they are considered to be inland therefore are included within the total United States. Those bay and estuarine water areas classified as "other than inland water" are not included within the total area of the United States. Only those bays and estuaries classified as inland water are included in this category. No category is applied to offshore waters beyond the limits of Bays and Estuaries. If emergent vegetation is present, the site is classified into a marsh class such as Coastal Salt Marsh (52110, 52120) or Coastal Brackish Marsh (52200).

DISTRIBUTION: This type occurs throughout coastal California and the Sacramento Delta.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

BEACHES AND COASTAL DUNES (11720): Beaches are the smooth sloping accumulations of sand and gravel along shorelines. The surface is stable inland, but the shoreward part is subject to erosion by wind and water and to deposition in protected areas. Coastal dunes such as Nipomo Dunes were included in this category to distinguish them from desert sand dune systems.

DISTRIBUTION: This type occurs throughout coastal California but was only mapped if the spatial extent was substantial.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

SANDY AREAS OTHER THAN BEACHES (11730): Sandy Areas other than Beaches are composed primarily of sand and gravel accumulation found in river flood plains. Sand dune communities normally included in this type in the standard classification of Anderson et al. Were mapped as (21210) for foredunes, (22100), (22200), or (23300) for desert and interior dune communities. Coastal dunes associated with beaches such as the Nipomo Dunes area were mapped as (11720).

DISTRIBUTION: This type occurs throughout California, but was primarily mapped in coastal river beds.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

BARE EXPOSED ROCK (11740): The Bare Exposed Rock category includes areas of bedrock exposure, desert pavement, scarps, talus, slides, volcanic material, rock glaciers, and other accumulations of rock without vegetation cover.

DISTRIBUTION: This type occurs throughout California in all regions.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

STRIP MINES, QUARRIES AND GRAVEL PITS (11750): Those extractive mining activities that have significant surface expression are included in this category. Vegetative cover and overburden are removed to expose deposits. Quarrying of building and decorative stone and recovery of sand and gravel deposits also result in large open surface pits. Current mining activity is not always distinguishable, and inactive, unreclaimed, and active strip mines, quarries, borrow pits, and gravel pits are included in this category until other cover or use has been established, after which the land would be classified in accordance with the resulting use or cover. Unused pits or quarries that have been flooded, however, are placed in the appropriate Water category.

DISTRIBUTION: This type occurs throughout California.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

MIXED BARREN LAND (11770): The Mixed Barren Land category is used when a mixture of Barren Land features occurs and the dominant land use occupies less than two-thirds of the area. Such a situation arises, for example, in a desert region where combinations of salt flats, sandy areas, bare rock, surface extraction, and transitional activities could occur in close proximity and in areal extent too small for each to be included at mapping scale. It also occurs in military bases when there is a mixture of Transitional Bare Area and other barren land types. Where more than one-third

intermixture of another use or uses occurs in a specific area, it is classified as Mixed Barren Land. Where the intermixed land use or uses total less than one-third of the specific area, the category appropriate to the dominant type of Barren Land is applied.

DISTRIBUTION: This type occurs throughout California.

Source: Adapted by the California Gap Analysis Project from Anderson et al., 1976.

CENTRAL DUNE SCRUB (21320) : A dense coastal scrub community of scattered shrubs, subshrubs, and herbs generally less than 1m tall and often developing considerable cover. Diagnostic species include *Ericameria ericoides, Lupinus chamissonis*, and *Artemisia pycnocephala*.

SITE FACTORS: Restricted to the coast on stabilized backdune slopes, ridges, and flats. Blowouts often recolonized by foredune species (21200), or (where the blowout reaches the groundwater table) by freshwater marsh taxa around a Dune Slack Pond or Lake (B1115, B1116). Intergrades toward the coast with Foredunes (21200) and away from the coast with Coastal Scrub (32200), Maritime Chaparral (37000), or Coastal Sage-Chaparral Scrub (37G00).

DISTRIBUTION: Restricted to the coastal strip roughly between Bodega Bay and Point Conception.

Source: Holland, 1986

NORTHERN COASTAL BLUFF SCRUB (31100) : A low, often prostrate, scrub 5-50cm high, forming continuous mats or more scattered. Dwarf shrubs, herbaceous perennials, and annuals are represented. Varying degrees of succulence are shown. Most growth and flowering occur in late spring and early summer, but can occur almost year-round.

SITE FACTORS: Exposed to nearly constant winds with high salt content. Soil usually rocky and poorly developed. Intergrades in less exposed situations with Coastal Prairie (41000), Northern Coastal Scrub (32100), or North Coast Coniferous Forest (82000) and Coastal Closed-cone Coniferous Forest (83100).

DISTRIBUTION: At localized sites along the coast, between Pt. Conception and Pt. Mendocino: Cape Mendocino; Mendocino County coastline; Bodega Head; Pt. Reyes; Pt. Lobos; Monterey County coastline; Pt. Buchon; Pt. Sal, etc.

Source: Holland, 1986

NORTHERN (FRANCISCAN) COASTAL SCRUB (32100) : Low shrubs, usually 0.5-2m tall, usually dense but with scattered grassy openings. Most growth and flowering occur in late spring and early summer. Three cover types are recognized on the basis of the dominant species: Northern Coyote Brush Scrub (32110), Northern Salal Scrub (32120), and Northern Silk Tassel Scrub (32130).

SITE FACTORS: On windy, exposed sites with shallow, rocky soils. Less exposed than Northern Coastal Bluff Scrub (31110), but usually more exposed than North Coast Coniferous Forest (82000) or Coastal Closed-Cone Coniferous Forest (83100).

DISTRIBUTION: Patchily distributed (often interspersed with Coastal Terrace Prairie (41100) from southern Oregon to Pt. Sur, Monterey County.

Source: Holland, 1986

CENTRAL (LUCIAN) COASTAL SCRUB (32200) : Shrubs, 1-2m tall, usually quite dense, lacking the grassy openings of Northern Coastal Scrub (32100) and with greater crown overlap than Coastal Sage Scrubs (32300, 32600, 32700). Shorter than, but often of similar density to the associated Upper Sonoran Mixed Chaparral (37100) and sharing with it several evergreen sclerophylls. Most growth occurs in late winter and spring; flowering is concentrated in spring and early summer, but may continue through most of the year. Some species are relatively inactive during the dry summer and fall, but this is less pronounced than in the Coastal Sage Scrubs. Adapted to fire by crown-sprouting.

SITE FACTORS: On exposed, often south-facing slopes with shallow, rocky soils. Geographically and environmentally intermediate between Northern Coastal Scrub (32100) and Venturan Coastal Sage Scrub (32300). Intergrades with Upper Sonoran Mixed Chaparral (37100) on locally moister, rocky sites and with Venturan Sage Scrub (32300) in southern San Luis Obispo and Northern Santa Barbara counties. This scrub often interdigitates with madrean woodlands and even redwoods on more mesic sites.

DISTRIBUTION: Common on the ocean side of the Santa Lucia range between Monterey and Pt. Conception, usually below about 2,000 feet.

Source: Holland, 1986

CHAMISE CHAPARRAL (CHAMISAL) (37200) : A 1-3m tall chaparral overwhelmingly dominated by chamise. Associated species contribute little to cover. Adapted to repeated fires by stump sprouting. Mature stands are densely interwoven with very little herbaceous understory or litter.

SITE FACTORS: Similar to Upper Sonoran Mixed Chaparrals (37100), but on shallower, drier soils or at somewhat lower elevations. Often on xeric slopes and ridges, with adjacent more mesic sites mantled by Upper Sonoran Mixed Chaparrals.

DISTRIBUTION: General distribution similar to Northern Mixed Chaparral (37110) but relatively infrequent in the north compared to its abundance in the south. The predominant chaparral type in Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties.

Source: Holland, 1986

SEMI-DESERT CHAPARRAL (37400) : Very similar to Northern Mixed Chaparral(37110), but more open and not quite so tall (1.5-3m). Several of the dominant taxa (*Juniperus, Eriogonum*, *Opuntia*, etc.) are not broad-leaved sclerophylls. Probably dormant in winter (from cold) and in late summer and fall (from drought).

SITE FACTORS: Similar to Northern Mixed Chaparral (37110), but drier and with colder winters. Very similar to Red Shank Chaparral (37300), but probably a bit drier and hotter in the summer. Often intergrading with Mojavean Piñon-Juniper Woodlands (72200), but on rockier soils or recently burned sites. Less fire-prone than other chaparrals due to lower fuel loads.

DISTRIBUTION: Inner South Coast Ranges form San Benito County to Kern County, extending into northern Ventura and Santa Barbara counties. Interior slopes of the Transverse and Peninsular Ranges bordering the Mojave and Colorado Deserts north to Kern County. Most common from 2,000-5,000 feet (610-1524m).

Source: Holland, 1986

MONTANE MANZANITA CHAPARRAL (37520) : Dense 2-5m tall chaparrals dominated by any of several species of manzanita. May occur as a post-fire successional stage in burned Westside Ponderosa Pine Forest (84210), Sierran Mixed Conifer Forest (84230), White Fir Forest (84240, 85320), or Jeffrey Pine Forest (85100). Plants dormant during winter, most active in late spring and early summer.

SITE FACTORS: Similar to and often intergrading with Upper Sonoran Mixed Chaparrals (37100), but generally at higher elevations and therefore cooler and moister. Often immediately below or on rockier more xeric sites than Westside Ponderosa Pine Forest (84210).

DISTRIBUTION: Scattered in Klamath and North Coast Ranges south to Lake County. Common in the western foothills of the Cascade-Sierra south to Yuba and Nevada counties (2,000-4,000 feet), scattered from there south in the Sierra to Kern County (3,000-5,500 feet) and the higher mountains of southern California.

Source: Holland, 1986

BLUE BRUSH CHAPARRAL (37820) : A tall chaparral (to 5-6m) dominated by *Ceanothus thrysiflorus.*

SITE FACTORS: Relatively mesic sites (for chaparrals), mostly in the Mixed Evergreen Forest (81100) zone, or intergrading with Northern (32100) or Central (32200) Coastal Scrubs; below 2,000 feet. This chaparral appears to be early seral after fire, especially in the southern part of its range where it eventually succeeds to Coast Live Oak Woodland (71160) or some Broadleaved Upland Forests (81000).

DISTRIBUTION: Outer Coast Ranges from southwestern Oregon to Santa Barbara County.

Source: Holland, 1986

INTERIOR LIVE OAK CHAPARRAL (37A00) : A dense, tall (to 20 feet) chaparral dominated by *Quercus wislizenii* and *Quercus berberidifolia* with several other sclerophylls also in the canopy. Interior live oak stump sprouts readily following fire. Persistent leaf litter and dense canopies preclude much understory.

SITE FACTORS: This is a fairly mesic chaparral of valleys and foothills away from the immediate coast, especially in Lower Montane Coniferous Forests (84000) where it frequently is a fire-climax. Often interdigitates with Blue Oak Woodland or Chamise Chaparral on adjacent south-facing slopes or on sites with shallower soils or poorer drainage. Recovers rapidly after fire.

DISTRIBUTION: Extensive in the Sierran foothills from Shasta to Kern counties, and North Coast Ranges south to Lake and Mendocino counties. Discontinuous south through the Central Coast, Transverse, and Peninsular ranges to northern Baja California. Intergrades at lower elevations with other more xeric chaparrals; at higher elevations with Interior Live Oak (81330) or Canyon Live Oak Forest (81320).

Source: Holland, 1986

UPPER SONORAN MANZANITA CHAPARRAL (37B00) : A dense chaparral to 15 feet in which dominance is shared by chamise and various species of manzanita.

SITE FACTORS: Most stands appear to be disturbance followers, establishing after fire, logging, hydraulic mining, or other disruptions. Young conifers (especially Abies concolor or Pinus ponderosa) often can be found beneath the shrub canopy in these seral stands.

DISTRIBUTION: Widespread in the Sierran foothills and Coast Ranges, usually at elevations higher than Chamise Chaparral (37200), but lower than Montane Chaparral

(37500). Somewhat more patchily distributed along the coastal side of the Transverse and Peninsular ranges, typically between 2,500 and 5,000 feet.

Source: Holland, 1986

CENTRAL MARITIME CHAPARRAL (37C20) : A variable sclerophyll scrub of moderate to high cover (50-100%) dominated by forms of *Arctostaphylos tomentosa* plus one or more other narrowly distributed manzanita.

SITE FACTORS: Well-drained, sandy substrates within the zone of summer coastal fog incursion. Fire appears necessary for continued reproduction. Intergrades on more mesic, less sandy sites with Monterey Pine Forest (83130), Bishop Pine Forest (83120), and Monterey Pygmy Cypress Forest (83162); with Chamise (37200) and Upper Sonoran Mixed Chaparral (37100) on stonier sites out of the foggy area; and with Lucian Coastal Scrub (32200) closer to the coast or on shaley substrates.

DISTRIBUTION: Survives at scattered locations near Monterey and Ft. Ord, and in southern San Luis Obispo and northern Santa Barbara counties.

Source: Holland, 1986

COASTAL SAGE-CHAPARRAL SCRUB (37G00) : A mix of sclerophyllous, woody chaparral species and drought-deciduous, malacophyllous sage scrub species.

SITE FACTORS: Apparently a post-fire successional community. Site factors need clarification. A catch-all type intermediate between Coastal Scrubs (32000) and chaparrals (37000).

DISTRIBUTION: Outer Coast Ranges and Peninsular Range from the Big Sur Coast south to Baja.

Source: Holland, 1986

VALLEY SACATON GRASSLAND (42120) : Midheight (to 3 feet) tussock-forming grassland dominated by *Sporobolus airoides*.

SITE FACTORS: Fine-textured, poorly drained, usually alkaline soils. Most sites have seasonally high water tables or are overflowed during winter flooding. Intergrades and often co-occurs with Alkali Meadow (45310) and Northern Claypan Vernal Pool (44120).

DISTRIBUTION: Formerly extensive in the Tulare Lake Basin and along the San Joaquin Valley through north to Stanislaus and Contra Costa counties, now much reduced.

Source: Holland, 1986

DESERT NATIVE GRASSLAND (42160) : Perennial bunchgrasses dominated solely or in combination by Indian Ricegrass (*Oryzopsis hymenoides*) and/or Desert Needlegrass (*Achnatherum speciosum*) and/or Big Galleta (*Pleauraphis rigida*). Grasses less one meter in height except for Indian Ricegrass which is less than 1.5 meters.

SITE FACTORS: Occurs on flat ridges, lower slopes, often in stabilized sandy areas. Stands are often small.

DISTRIBUTION: This type includes at least three of the CNPS proposed alliances for the Mojave. Further study of the distribution of the type is recommended.

Source: California Gap Analysis Project, Kathryn Thomas

CENTRAL COAST COTTONWOOD-SYCAMORE RIPARIAN FOREST (61210) : Moderately closed broadleafed riparian forests dominated by *Platanus racemosa* and *Populus fremontii*, with lesser amounts of *Quercus agrifolia*. Understories may be dense thickets of shrubby willows, *Baccharis*, or *Urtica*. Similar to and perhaps the same as Southern Cottonwood-Sycamore Riparian Forests (61330).
SITE FACTORS: Floodplains of sub-perennial streams, usually with fairly coarse bedload and seasonally variable depths to the water table. The dominant type on steeper reaches, this forest intergrades with arroyo willow-dominated types (61230, 61320) at lower elevations or along flatter stream reaches with finer-textured sediment and more constant depth to the water table.

DISTRIBUTION: Canyons and creeks throughout the South Coast Ranges. Distinctions between this type and Southern Cottonwood-Sycamore Riparian Forest (61330) need to be clarified.

Source: Holland, 1986

CENTRAL COAST LIVE OAK RIPARIAN FOREST (61220) : A low, evergreen sclerophyllous riparian forest, usually with an open appearance, dominated by *Quercus agrifolia*. This type has many species usually associated with Coast Live Oak Woodland (71160) or Chaparral (37000) in the open understory. Grasses usually form a fairly extensive ground layer. Similar to and questionably distinct from Southern Coast Live Oak Riparian Forest (62310).

SITE FACTORS: Drier, outer floodplains along perennial streams, in many respects ecotonal between more mesic cottonwood or willow dominated streams and more xeric chaparrals.

DISTRIBUTION: Canyon bottoms and floodplains of the South Coast and Transverse ranges, from Sonoma County south to near Pt. Conception.

Source: Holland, 1986

CENTRAL COAST ARROYO WILLOW RIPARIAN FOREST (61230) : Dense, low, closed-canopy broadleafed winter-deciduous riparian forests dominated by *Salix lasiolepis*. This plant often grows as a large, tree-like shrub. Reproduction may be limited to plants that establish on fallen logs.

SITE FACTORS: Moist to saturated sandy or gravelly soil, especially on bottomlands or around dune slack ponds within the coastal fog incursion zone.

DISTRIBUTION: Low gradient stream reaches near the coast from Monterey south at least as far as Santa Barbara.

Source: Holland, 1986

TAMARISK SCRUB (63810) : A weedy, virtual monculture of any of several *Tamarix* species, usually supplanting native vegetation following major disturbance.

SITE FACTORS: Sandy or gravelly braided washes or intermittent streams, often in areas where high evaporation increases the stream's saltiness. Tamarisk is a strong phreatophyte and a prolific seeder, attributes which predispose the species to be aggressive competitors in disturbed riparian corridors.

DISTRIBUTION: Widely scattered and increasing its range, throughout the drier parts of California from the rainshadow east of the Inner North Coast Ranges south through the Great Valley to southern California and across the deserts to Nevada, Arizona, and beyond.

Source: Holland, 1986

OREGON OAK WOODLAND (71110) : This woodland varies from pure, closed-canopy stands of *Quercus garryana* to mixtures with conifers and broadleaf trees to open savannas.

SITE FACTORS: Drier, warmer slopes and canyon bottoms within the Mixed Evergreen (81100) and Douglas Fir (82400) Forests. Many stands have older, open-growth form trees surrounded by more narrow-canopied, younger trees-a reflection of reduced fire frequency.

DISTRIBUTION: Coast Ranges from the Santa Cruz Mountains north, and the Cascades from the Pit River drainage north into southern Oregon.

Source: Holland, 1986

BLACK OAK WOODLAND (71120) : Open to dense woodlands are dominated by *Quercus kelloggii*. Shrubby understories are partly open, often with *Cercocarpus betuloides*. *Pinus ponderosa* is a common associate on all but the poorest sites. Most stands are even aged and younger than 125 years. Ground cover usually is well developed, contributing to a good litter layer.

SITE FACTORS: Mainly a seral community maintained by fire. *Quercus kelloggii* is a vigorous stump sprouter. Stands younger than about 60 years are not very resistant to fire. Stands that have been overtopped by taller conifers may decline because *Quercus kelloggii* is very shade-intolerant. Best developed between 1,500 and 3,000 feet, in areas receiving 30-50 inches of rain (to 7,000 feet in southern California).

DISTRIBUTION: Discontinuously scattered from the central Oregon Cascades south through the mountains to near the Mexican border. Best developed in the southern Cascades and Klamath mountains and northern parts of the Coast Ranges and Sierra Nevada, especially between 2,500 and 5,000 feet.

Source: Holland, 1986

VALLEY OAK WOODLAND (71130) : Similar to Oregon Oak Woodland (71110) and Blue Oak Woodland (71140), but typically more open, forming a grassy-understoried savanna rather than a closed woodland. *Quercus lobata* is usually the only tree present. This winter-deciduous species is California's largest broad-leaved tree, with mature individuals reaching 15-35m. Most stands consist of open-canopy growth form trees and seldom exceed 30-40% absolute cover.

SITE FACTORS: On deep, well-drained alluvial soils, usually in valley bottoms, apparently with more moisture in summer than in Blue Oak Woodland (71140). Intergrades with Great Valley Valley Oak Riparian Forest (61430) near rivers and with Blue Oak Woodland (71140) on drier slopes. Also found on nonalluvial settings in the South Coast and Transverse ranges. Fire may have prevented some valley oak stands from succeeding to Ponderosa Pine (84130, 84210) or Coulter Pine (84140) forests before fire suppression.

DISTRIBUTION: Sacramento and San Joaquin valleys adjacent to the Sierra Nevada foothills; valleys of the Coast Ranges from Lake County to western Los Angeles County. Usually below 2,000 feet (610m).

Source: Holland, 1986

INTERIOR LIVE OAK WOODLAND (71150) : A broad-leaved, sclerophyllous woodland to 50 feet tall dominated by *Quercus wislizenii*, with *Quercus douglasii*, *Aesculus californica* and *Umbellularia californica* also important. Dense canopy closure and abundant, persistent leaf litter preclude much herbaceous understory.

SITE FACTORS: Usually on sloping to steep, north-facing hillsides below about 8,500 feet. Intergrades with Mixed Evergreen (81100) and Upland Redwood Forest (82320) on more mesic sites; or with Scrub Oak (37800) and Interior Live Oak Chaparral (37A00) on more xeric or frequently burned sites. This forest recovers from fire very rapidly. Canopy closure may reach 80% within 10 years.

DISTRIBUTION: Extensive from Shasta County south through the North Coast Range to Sonoma and Lake counties and down the Sierran foothills to the Kern River. Scattered in Central Coast Ranges (especially to Santa Cruz and Monterey counties), Transverse and Peninsular ranges to northern Baja California.

Source: Holland, 1986

MIXED EVERGREEN FOREST (81100) : Dominated by broadleaved trees, 10-30m tall, often with taller conifers interspersed, forming a closed forest. Most species are sclerophyllous evergreens, but winter-deciduous species also occur. Relatively little understory grows under the dense canopy. Often occurs in small, mosaic-like patches, surrounded by grassland on heavier soils. Most species are relatively inactive during the winter; growth increases rapidly in spring and continues at a reduced rate into summer.

SITE FACTORS: On moist, well-drained, coarse soils, usually on slopes. Often around rock outcrops on heavier soils. Intergrades with Californian Mixed Chaparral (37110) on drier, rockier slopes; with Coast Live Oak Forest (81310) on drier, interior slopes; with Oregon Oak Woodland (71110), or Valley and Foothill Grassland (42000) on drier, fine-textured soils; with Douglas Fir Forest (82400) or Redwood Forest (82300) on moister slopes or canyon bottoms and with Coast Range Coniferous Forests (84100) at higher elevations. Geographically and biologically transitional between the dense coniferous forests of northwestern California and the open woodlands and savannas of the interior. Each of the dominant species, except *Arbutus menziesii*, is well-represented in one or more of these other habitat types.

DISTRIBUTION: More or less continuous from Santa Cruz Co. northward through the outer coast ranges into Oregon, usually away from the immediate coast. Typically follows the upper and/or inland margins of the coastal Redwood Forest (82300) or Douglas Fir Forest (82400). Also on north-facing slopes of the inner north coast ranges, and Santa Lucia Mountains, and with smaller outliers extending to Santa Barbara Co. Elevations ranging from 200-3,000 feet (60-910m) in the north to 1,000-4,000 feet (300-1210m) in the south.

Source: Holland, 1986

CALIFORNIA BAY FOREST (81200) : Similar to Mixed Evergreen Forest (81100), but typically consisting entirely of Umbellularia californica, broadleaved sclerophyll tree up to 30m tall. Often forms dense, wind-pruned stands less than 10m tall on exposed coastal slopes. Even away from the coast, stands are usually dense (probably from cloning after fires) and support little or no understory.

SITE FACTORS: Similar to Mixed Evergreen Forest (81100), but probably somewhat moister. Usually occurs on exposed slopes and ridges to the north of San Francisco Bay and on moist, north-facing slopes further south. Adapted to the seawinds of exposed coastal slopes. Responds to fire by crown-sprouting. Merges with Mixed Evergreen Forest (81100) toward the interior, Redwood Forest (82300) on moister slopes or in canyons with Californian Mixed Chaparral (37110) on drier, rockier slopes.

DISTRIBUTION: Outer Coast Ranges from the Oregon border to northern San Luis Obispo Co. Best developed away from the immediate coast to the north of San Francisco Bay, and close to the coast south of the bay. The occurrence is usually patchy, with stands limited to a few acres. Elevation usually below 3,000 feet (910m).

Source: Holland, 1986

UPLAND REDWOOD FOREST (82320) : Similar to Alluvial Redwood Forest (82310) but not quite so tall, with a greater diversity of tree species and a more shrubby understory. Growth is more likely to be limited by drought in summer and fall. *Sequoia sempervirens, Lithocarpus densiflora*, and a few other species respond to fire by crown-sprouting, often becoming multi-trunked as a result.

SITE FACTORS: Similar to Alluvial Redwood Forest (82310); growing within reach of summer fogs, with inland and upper altitudinal ranges possibly limited by this factor. On shallow- well-drained soils, often on steep slopes subject to erosion; confined to north exposures and canyon bottoms near the interior and southern margins of the range. Often stunted and wind-pruned on the Monterey coast. Subject to infrequent devastating fires. Intergrades with Sitka Spruce-Grand Fir Forest (82100), Western Hemlock Forest (82200), or Alluvial Redwood Forest (82310) on moister or more coastal sites in the north, and with Douglas Fir Forest (82400), Mixed Evergreen Forest (81100) or Californian Mixed Chaparral (37110) toward the interior, at higher elevations, or on rockier, drier soils.

DISTRIBUTION: Abundant and nearly continuous in the outer Coast Ranges from extreme southwestern Oregon to Sonoma Co. Abundant in southern Marin Co. and from southern San Mateo Co. through Santa Cruz Co. In coastal canyons of Monterey Co. south of Monterey, nearly to the San Luis Obispo Co. line. Extends inland about 35 miles near the headwaters of the Russian River, Mendocino Co. and 45 miles in southeastern

Napa Co. Elevation from sea level to about 3,000 feet. Usually absent from exposed coastal headlands and the entire region of Cape Mendocino, Humboldt Co.

Source: Holland, 1986

UPLAND DOUGLAS FIR FOREST (82420) : A tall (60m), mixed-age climax forest dominated (greater than 80%) by Douglas Fir. Most stands dominated by Douglas Fir are seral to Sitka Spruce-Grand Fir Forest (82100) or Western Hemlock Forest (82200). These typically are even-aged, dense (with canopy closure greater than 70%).

SITE FACTORS: Climax stands appear restricted to droughty but not xeric conditions as caused by rainshadows, overly-drained soils, or aspect. Sites typically occur on moderately deep, well-drained soils. Annual precipitation ranges from 23 to 120 inches.

DISTRIBUTION: North Coast Ranges discontinously scattered from Mendocino Co. north to Oregon, thence more extensive west of the Cascade crest into British Columbia, up to, occasionally occurring as high as 6,000 feet.

Source: Holland, 1986

BISHOP PINE FOREST (83120): Forests up to 25m tall in the north (83121), usually shorter toward the south (83122). Relatively open on poorer sites but very dense, even-aged stands may follow fires. Typically dominated by pure stands of *Pinus muricata*, sometimes with *Pinus remorata* in the south. Cones remain closed on the trees for many years. The seeds are released in large quantities and germinate freely following fires. The understory of shrubs and perennial herbs is almost continuous in open stands on moist sites and nearly absent from dense stands or dry, rocky sites. The main growing and flowering season is spring, with some activity through the rest of the year.

SITE FACTORS: Very similar to Beach Pine Forest (83110) but somewhat drier. Often on sterile, rocky soil. Often foggy during spring and early summer, with perhaps more summer fog in the south. Subject to periodic conflagration. Intergrades in northern California with Northern Coastal Scrub (32100) on rocky, exposed sites, with Upland Redwood Forest (82320) on protected sites and with Pygmy Cypress Forest (83160) on coastal terraces with podzol soils. In San Luis Obispo and Santa Barbara counties, it intergrades with Central Coastal Scrub (32200) or Upper Sonoran Mixed Chaparral (37100) on dry, rocky sites.

DISTRIBUTION: Northern type (83121) is abundant near the coast from the vicinity of Fort Bragg, Mendocino Co. to northern Sonoma Co. On Inverness Ridge and Mt. Tamalpais, Marin Co. One small stand in the Del Monte Forest on the Monterey Peninsula. The southern type (83122) common in the hills near Point Buchon, San Luis Obispo Co., especially in Hazard Canyon. Scattered through the Purisima Hills and Santa Ynez Mountains or western Santa Barbara Co. and on Santa Cruz and Santa Rosa Islands.

Source: Adapted from Holland, 1986.

KNOBCONE PINE FOREST (83210) : A fire-maintained, variable forest dominated by *Pinus attenuata* that may reach 25-30m, though usually closer to 15m tall. Stands usually are even-aged except on relatively "fire-proof", rocky sites. Understories usually are sparse scatters of chaparral shrubs whose composition varies greatly over the type's range.

SITE FACTORS: Shallow, dry, stoney sites, often on serpentine or other magnesium-rich ultramafics that limit effective conifer competition. Adapted to frequent fires by means of very early and abundant production of seeds, which are retained in the closed cones until released by the heat of a fire. Similar to Bishop Pine Forest (83120), but in more interior, hotter and drier localities, where growth is probably more limited by drought in summer. Often associated with Serpentine Chaparral (37600), Chamise Chaparral (37200) or Californian Mixed Chaparral (37110). On better-developed or nonserpentine soils, may intergrade with Broadleaved Upland Forest (81000), North Coast Coniferous Forest (82000) or Lower Montane Coniferous Forest (84000).

DISTRIBUTION: Abundant in the Siskiyou, Klamath and North Coast Ranges away from the immediate coast, from southwestern Oregon to southern Sonoma and Napa counties. On Mt. Diablo, Contra Costa Co. Abundant in the Santa Cruz Mountains in Santa Cruz and Santa Clara counties. In the Santa Lucia Mountains of Monterey Co. and near San Luis Obispo. Eastward from the Klamath Mountains across the southern Cascade Range to Modoc Co. On the west slope of the Sierra Nevada from Sierra to El Dorado counties and Mariposa Co. Also in the San Bernardino Mountains and Santa Ana Mountains in southern California, and near Ensenada, Baja California. Elevation usually between 1,000-5,000 feet (300-1500m), occasionally to 6,000 feet (1800m).

Source: Holland, 1986

Appendix 4
Summary of the California Gap Analysis Project

Both the methods and results of the California Gap Analysis Project are presented here in summary form, including a more detailed discussion of the state project's land cover layer, which was used in the Bay Area analysis. This appendix explains how that layer was created and discusses the vegetation classification system. A full description of the state analysis may be found at www.biogeog.ucsb.edu.

I. Methods

Land Cover Layer

The California Gap Analysis Project developed a land cover layer of actual vegetation at 1:100,000 scale. Given the scope and cost of the mapping effort, the project opted to map "landscapes" instead of individual stands of homogenous vegetation. "Landscape" was defined as an area of one to many square kilometers in extent with uniform climate, physiography, substrate and disturbance regime, and covered by a single species assemblage or by a mosaic of a few species assemblages associated with different sites.

Landscape unit boundaries were delineated from summer 1990 Landsat Thematic Mapper satellite images, 1990 high-altitude color infrared photography (1:58,000 scale), and large-scale vegetation maps. Attribute data were derived from the high-altitude color photography, California Vegetation Type Mapping (VTM) surveys (Weislander 1946) conducted between 1928 and 1940, ground surveys, and local or regional large-scale maps.

Landscape-size map units were delineated on-screen over the TM imagery on the basis of relatively homogeneous color, tone, and texture. In many cases, boundaries were added or moved based on higher resolution data from aerial photography or larger scale vegetation maps. The minimum mapping unit for wetlands was 40 hectares (1 hectare = 2.47 acres) and for upland communities was 100 hectares. A more complete description of the mapping process is provided in Davis and others (1991, 1995, 1998).

Metadata for the land cover layer used in the San Francisco Bay Area is as follows:

Central Western California sources: Vegetation polygons were attributed using VTM data, maps of hardwood forests and woodlands (Pillsbury et al. 1991) and redwoods (Fox 1988), and field surveys. Air photo interpretation techniques were used to confirm, enhance, and in some cases where no other data were available, supply polygon attributes. National High Altitude Photography (NHAP) and NASA-JPL color infrared transparencies were viewed stereoscopically to identify vegetation types, percent coverage, canopy closure, and disturbance. The NHAP photos are at a scale of 1:58,000 and dated from 1980-1984, while the NASA-JPL photos are at a scale of 1:65,000 and dated late 1980s to early 1990s.

Northwestern California sources: Vegetation polygons were delineated in a first iteration from the CALVEG map (Parker and Matya 1981) and Fox's (1988) map of redwoods. The polygons were attributed using a combination of VTM data, a map of hardwoods (Pillsbury et al. 1991), the map of redwoods (Fox 1988), field surveys by UCSB staff (562 polygons were checked in the field), and aerial photography. In addition, the GIS Potential Natural Vegetation coverage for the Six Rivers National Forest and GIS coverages of timber types for the Klamath and Shasta Trinity National Forests were used. Expert opinion was solicited from Forest Service botanists and ecologists.

Great Valley sources: Initial landscape boundaries were derived from the USGS Digital Land Use and Land Cover maps (DLULC, USGS 1986). This base map was then edited subjectively by photo interpretation of patterns in the satellite imagery to improve registration of distinct edges and to account for recent land use changes. Wetlands were added from the 1:24,000 scale digital National Wetlands Inventory (NWI) maps from the U. S. Fish and Wildlife Service. The detailed map units of NWI, which were available in digital form only from Fresno northward at the time, were generalized into larger landscapes for gap analysis purposes. Other source maps for delineating landscapes include relic patches of native perennial bunchgrass prairie (Barry 1972 and redrawn by Dremann 1988); Carrizo Plain from the Bureau of Land Management, Bakersfield District; Southern San Joaquin Valley from the California Energy Commission (Anderson and others 1991); and riparian forests (Nelson and Nelson 1984).

For each landscape unit, a significant amount of information was entered into the database. Only the information relevant to the San Francisco Bay Area gap analysis is discussed here. Dominant species data were obtained from existing ancillary sources, primarily the VTM survey maps. Assignment of polygons to classes such as Holland communities (Holland 1986, described further below) was done by interpretation of the dominant plant species list associated with each map unit in a look-up table. Each polygon was coded with a primary natural community type, and if present, secondary and tertiary types and the percent coverage of each of these within the polygon. Primary natural communities may occupy from 30-100% of the polygon. Secondary natural communities range from 0-40%, but will be equal to or less than the proportion of primary community. Tertiary natural communities range from 0-30%, but will not exceed the proportion of the secondary community. As a result, a polygon's composition can range from 100% Community A (primary) with no secondary or tertiary community, to 34% Community A (primary), 33% Community B (secondary) and 33% Community C (tertiary). Percent cover of the primary, secondary, and tertiary types were estimated from aerial photography.

Several land cover and land use classification systems were used in assigning land cover classes with the goal of providing the greatest possible thematic detail. Natural communities were classified principally under the "Holland" system (Holland 1986). This system was used by the California Department of Fish and Game's California Natural Diversity Database at that time, but has since been replaced. Twelve new natural community types were also defined by the California Gap Analysis Project for the mapping process. Wetlands were classified according to the widely used "Cowardin"

system (Cowardin et al. 1979). And finally, a number of land use classifications for non-vegetated areas were developed based on the "Anderson" system (Anderson et al. 1976). The result was 194 natural plant community types and 27 land cover classes (Appendix 5). A portion of the statewide land cover layer is shown in Figure 2 of Section 2 of this report. Only one county, Santa Clara, is shown in order to display the map at a scale appropriate to illustrate polygon detail.

The state project did not conduct a formal statistical accuracy assessment of the land cover layer. Instead, an informal assessment was carried out "via roadside reconnaissance and by comparing our map with recent detailed vegetation maps that have been prepared for parts of the region" (Davis et al. 1998). The *California Gap Analysis Project Final Report* (Davis et al. 1998) does not provide the results of this informal assessment but notes that, "our studies indicate that the vegetation database has inaccuracies but is generally in high agreement with other recent vegetation maps…." The distribution of all dominant plant species was compared with the documented distribution in the CalFlora database (www.calflora.org) and the distributions in Holland (1986). Outlying species were rechecked and modified if it appeared that a classification error had occurred.

In lieu of providing a statistically valid accuracy assessment, the California Gap Analysis Project provided qualitative guidelines for use, which included the following points:

1. The data are intended for use at a scale of 1:100,000 or smaller.
2. The data should be used to provide context for regional-scale areas of several hundred thousand to millions of hectares in size.
3. The data is appropriate for regional conservation planning or natural resource management planning.

Once the land cover map was completed, statewide total areas were calculated for all community types. In each case, these totals include the areas mapped as primary, secondary and tertiary vegetation within the polygons.

Stewardship Layer

The stewardship layer was derived from an existing 1:100,000 land ownership layer maintained by California's Teale Data Center and supplemented with corrections and recent additions of publicly owned lands. The *California Gap Analysis Project Final Report* notes that a minimum mapping unit of 200 hectares was applied to Status 1 land units. The report does not specify the minimum mapping unit, if any, applied to units in status 2, 3 or 4. Ownership polygons were classified into four protection status levels according to standardized definitions developed by the national gap analysis program. The four levels describe the relative degree of long-term management focus on biodiversity conservation as indicated by legislation or expressed in other written policies. The classification scheme is described in detail in Section 2.2 of this report.

Since the stewardship layer included approximately 3000 ownership polygons, some simplifying procedures were needed to assign status categories to land units. The California Gap Analysis Project developed the guidelines presented in Appendix 2. On

completion of the stewardship classification process, statewide total area for each category was calculated.

The San Francisco Bay Area Gap analysis did not use this stewardship layer, but rather developed its own, as described in Section 2.2.

Representation Analysis

Following the completion of the land cover and stewardship data layers, the two layers were overlaid to identify the natural communities present within protected areas. The extent of each natural community within each protection level was tabulated for the entire state. This number was then compared to the total area of each natural community and converted to a percentage in protected status.

The California Gap Project elected to compare the results of the previous step against levels of 10%, 20% and 50% protection. These benchmark levels were selected based on estimates of land area needed to ensure persistence of communities based on articles published in the conservation biology literature. The range illustrates the divergence of opinions within the conservation community regarding adequate representation.

II. Results

California's Land Cover

Eight natural communities in California collectively cover approximately 35% of the state's total land area and 45% of its vegetated area. These communities and their respective extents are detailed in Table A. The statewide distributions of these most common natural communities are shown in Figure A.

Table A. Most Common Natural Communities in California.

Natural Community Name	Statewide Extent ($km^{2)}$	Percent of Total State Area
Mojave Creosote Bush Scrub	43,711	10.7
Non-native Grassland	27,483	6.7
Sierran Mixed Coniferous Forest	15,637	3.8
Coast Range Mixed Coniferous Forest	13,539	3.3
Sonoran Creosote Bush Scrub	12,625	3.1
Mojave Mixed Woody Scrub	10,542	2.6
Blue Oak Woodland	10,542	2.6
Foothill Pine-Oak Woodland	10,180	2.5

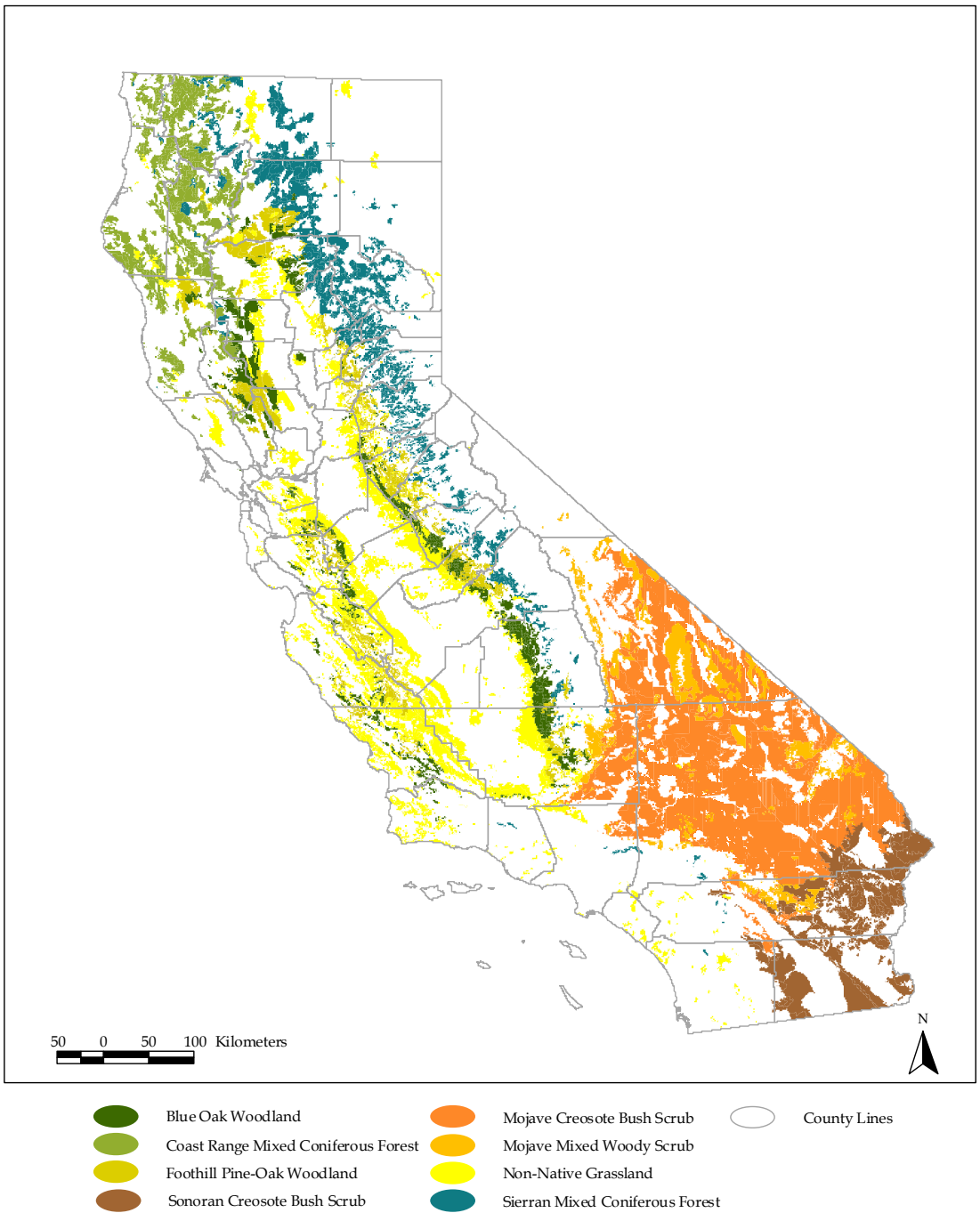


Figure A. Statewide Distribution of California's Most Common Natural Communities.

In contrast, 37 of California's rarest natural communities were each mapped over a total area of less than 25 km^2 within the state (Figure B). These communities may be rare for any of several reasons, including but not limited to: 1) some habitats historically have had

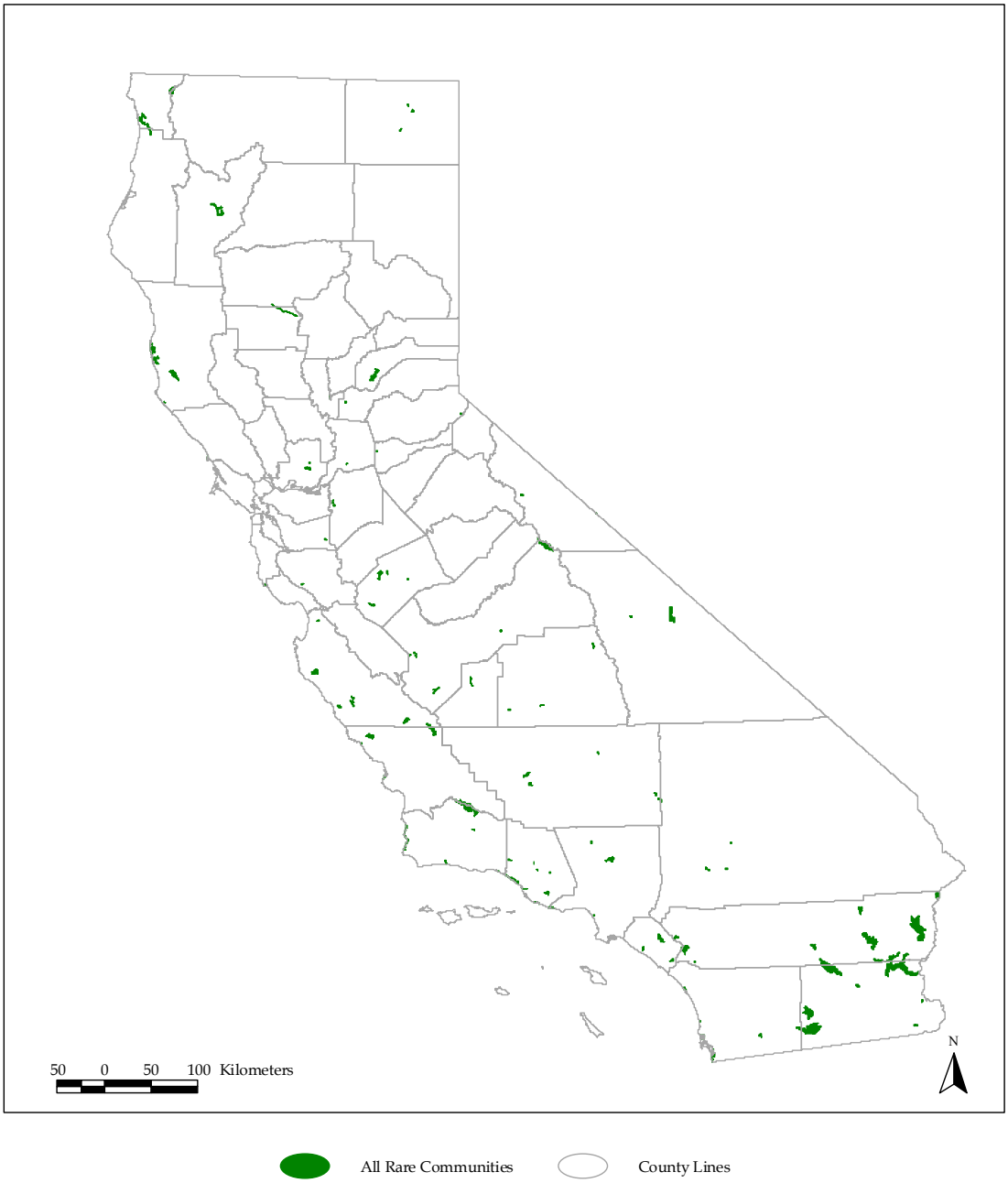


Figure B. Statewide Distribution of California's Least Common Natural Communities.

small extents within the state of California; 2) some have been reduced from greater extents through widespread invasion by exotic species or conversion to anthropogenic use; and 3) some habitats typically occur as patches too small to be mapped under the gap analysis minimum mapping area. In the latter case, the community may be more widespread than the data indicate. The complete list of the statewide areas of all natural communities is found in Appendix 5.

Stewardship

The stewardship layer developed by the California Gap Analysis Project provides a number of insights regarding land ownership and management in California.

- Slightly less than 50% of California is privately owned.
- Approximately 21% of the state's land surface is found in agriculture, urban or built-up land, planted forest plantations, or in bare ground.
- Approximately 18% of the state's land surface is protected in Status 1 or Status 2 lands.
- Approximately 52% of the state's land surface is managed as Status 4 lands. This includes the slightly less than 50% that is privately owned, as well as some publicly owned lands that are managed for purposes that exclude biodiversity protection.
- The remaining lands, approximately 32%, are Status 3 publicly owned lands. These may have some biodiversity protection but are managed primarily for other purposes.
- Stewardship of the publicly owned portion of California is distributed among the US Forest Service, Bureau of Land Management, National Park Service, military bases, U.S. Fish and Wildlife Service, tribal lands, California Department of Parks and Recreation, California Fish and Game, California State Forests, other State lands, local governments, and private conservation groups.
- Publicly owned land is concentrated in the eastern half of California.
- Relatively little publicly owned land is located in the Central Valley, some coastal regions, the Modoc Plateau, or the foothills of the Sierra Nevada and Cascades.
- The central coast and San Francisco Bay Area include moderate amounts of publicly owned lands.
- 371 Status 1 managed areas were mapped for a total of 62,387 km^2 or approximately 1/6 of the land area of the state. These are primarily National Parks, BLM Wilderness Areas and Forest Service Wilderness Areas.
- 370 Status 2 managed areas were mapped for a total of 10,853 km^2. Ownership of these areas is distributed over various state and federal agencies.
- The combined total of Status 1 and Status 2 lands is 741 individual areas. If boundaries between contiguous parcels of Status 1 and 2 lands are ignored, 22

large tracts of land contribute 75% of the total protected area in the state. About half of the state's conservation areas are less than 200 hectares. This finding is significant because smaller patches of habitat often do not support the same number of species as larger patches of similar habitat.

Figure C below illustrates the distribution of Status 1, 2, and 3 lands in California, as mapped by the California Gap Analysis Project.

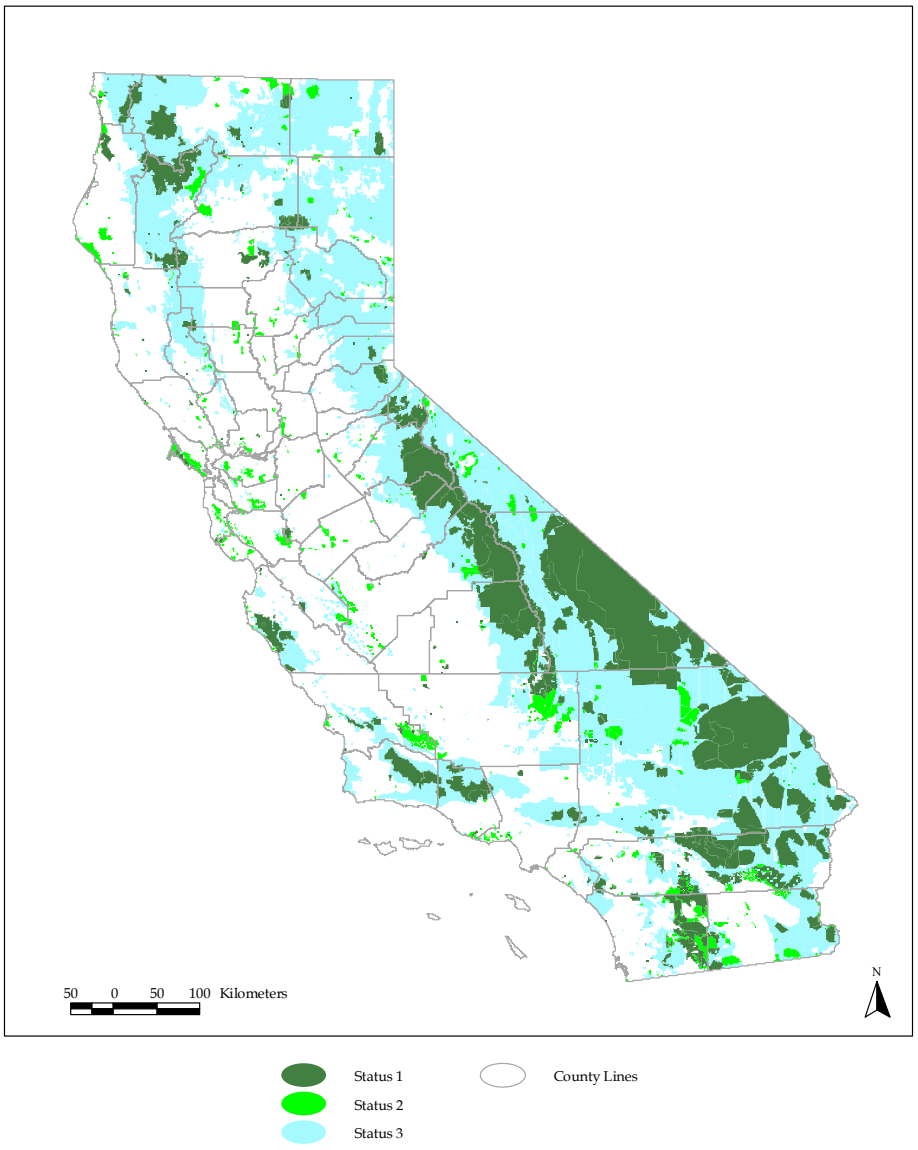


Figure C. California's Land Stewardship. California Gap Analysis Project, 1998.

Representation Analysis

The final step in this portion of the California Gap Analysis Project was superimposing the stewardship layer on the land cover layer to determine how much of each natural community is contained within Status 1 and Status 2 lands. Appendix 6 details the complete results of this step, but the most significant results are summarized below.

- Seventy-three natural communities have less than 10% of their total area represented within Status 1 and Status 2 areas. (Seventy-five land cover types with less then 10% protection are listed in Appendix 6, but two of these are not natural communities.) Nineteen of these have mapped distributions of less than 25 km^2. These are among the 37 rare communities displayed in Figure B.
- Forty-six community types have between 10 and 20% of their total area protected within Status 1 and Status 2 managed areas. Many of these are chaparral types.
- Forty-four communities have 20-50% of their extent in protected status. This includes many communities found in the deserts, marshes and upper conifer zone.
- Thirty-one communities have greater than 50% of their extent contained within protected areas. Of these, eight are statewide rare communities that were mapped at less than 25 km^2. Two types, Northern Coastal Bluff Scrub and Santa Lucia Fir Forest, are completely protected.

Appendix 5
Extents of California Natural Communities and Land Cover Types
Mapped by the California Gap Analysis Project

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (km^2)	Percent of State
21210	Northern Foredunes	3.4	<0.1
21310	Northern Dune Scrub	106.9	<0.1
21320	Central Dune Scrub	13.6	<0.1
22000	Desert Dunes	2,155.10	0.5
23300	Monvero Residual Dunes	3.0	<0.1
31100	Northern Coastal Bluff Scrub	39.1	<0.1
31200	Southern Coastal Bluff Scrub	22.6	<0.1
32100	Northern (Franciscan) Coastal Scrub	469	0.1
32200	Central (Lucian) Coastal Scrub	680.5	0.2
32300	Venturan Coastal Sage Scrub	2,102.10	0.5
32500	Diegan Coastal Sage Scrub	1,316.90	0.3
32600	Diablan Sage Scrub	1,107.30	0.3
32700	Riversidian Sage Scrub	744.3	0.2
33100	Sonoran Creosote Bush Scrub	12,625.10	3.1
33200	Sonoran Desert Mixed Scrub	6,323.90	1.5
34100	Mojave Creosote Bush Scrub	43,711.60	10.7
34210	Mojave Mixed Woody Scrub	10,542.30	2.6
34220	Mojave Mixed Steppe	643.7	0.2
34240	Mojave Mixed Woody and Succulent Scrub	574.6	0.1
34300	Blackbush Scrub	1,796.60	0.4
35100	Great Basin Mixed Scrub	6,391.20	1.6
35110	*Salvia dorri/Chamaebatiaria* scrub *	30.4	<0.1
35210	Big Sagebrush Scrub	4,341.20	1.1
35211	Low Sagebrush Scrub *	1,623.80	0.4
35212	Silver Sagebrush Scrub *	431	0.1
35213	Black Sagebrush Scrub *	18.2	<0.1
35220	Subalpine Sagebrush Scrub	171.4	<0.1
35400	Rabbitbrush Scrub	419.1	0.1
35500	*Cercocarpus ledifolius* Woodland *	828.2	0.2
36110	Desert Saltbush Scrub	4,723.20	1.2
36120	Desert Sink Scrub	697.4	0.2
36130	Desert Greasewood Scrub	829.6	0.2

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (Km^2)	Percent of State
36140	Shadscale Scrub	3,492.30	0.9
36150	Desert Holly Scrub *	1,448.00	0.4
36210	Valley Sink Scrub	250.4	0.1
36220	Valley Saltbush Scrub	1,915.50	0.5
36320	Interior Coast Range Saltbush Scrub	27.7	<0.1
37110	Northern Mixed Chaparral	1,652.40	0.4
37120	Southern Mixed Chaparral	219.4	0.1
37200	Chamise Chaparral	5,381.40	1.3
37300	Red Shank Chaparral	965.6	0.2
37400	Semi-Desert Chaparral	2,462.40	0.6
37510	Mixed Montane Chaparral	1,852.00	0.5
37520	Montane Manzanita Chaparral	1,329.00	0.3
37530	Montane Ceanothus Chaparral	1,083.60	0.3
37541	Shin Oak Brush	202.9	<0.1
37542	Huckleberry Oak Chaparral	287.4	0.1
37550	Bush Chinquapin Chaparral	190.4	<0.1
37610	Mixed Serpentine Chaparral	217.2	0.1
37620	Leather Oak Chaparral	98.4	<0.1
37810	Buck Brush Chaparral	4,196.30	1
37820	Blue Brush Chaparral	74.3	<0.1
37830	*Ceanothus crassifolius* Chaparral	2,092.60	0.5
37840	*Ceanothus megacarpus* Chaparral	583	0.1
37900	Scrub Oak Chaparral	2,162.00	0.5
37A00	Interior Live Oak Chaparral	2,105.10	0.5
37B00	Upper Sonoran Manzanita Chaparral	836.3	0.2
37C10	Northern Maritime Chaparral	2.9	<0.1
37C20	Central Maritime Chaparral	218	0.1
37D00	Ione Chaparral	0.8	<0.1
37E00	Mesic North Slope Chaparral	628.3	0.2
37G00	Coastal Sage-Chaparral Scrub	345.4	0.1
39000	Upper Sonoran Subshrub Scrub	375.2	0.1
41000	Coastal Prairie	880.3	0.2
42110	Valley Needlegrass Grassland	7.4	<0.1
42120	Valley Sacaton Grassland	9.1	<0.1
42160	Desert Native Grassland *	300.3	0.1
42200	Non-Native Grassland	27,483.40	6.7

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (Km^2)	Percent of State
42300	Wildflower Field	7.0	<0.1
43000	Great Basin Grassland	117.9	<0.1
44110	Northern Hardpan Vernal Pool	0.1	<0.1
44120	Northern Claypan Vernal Pool	1.6	<0.1
44131	Northern Basalt Flow Vernal Pool	3.9	<0.1
45100	Montane Meadow	360.5	0.1
45200	Subalpine or Alpine Meadow	285.5	0.1
45310	Alkali Meadow	477	0.1
45500	Great Basin Wet Meadow *	197	<0.1
46000	Alkali Playa	1,436.50	0.4
47000	Pavement Plain	11.3	<0.1
51110	Sphagnum Bog	1.1	<0.1
52110	Northern Coastal Salt Marsh	84.7	<0.1
52120	Southern Coastal Salt Marsh	11	<0.1
52200	Coastal Brackish Marsh	310.8	0.1
52310	Cismontane Alkali Marsh	24.5	<0.1
52320	Transmontane Alkali Marsh	33.8	<0.1
52410	Coastal and Valley Freshwater Marsh	501.3	0.1
52420	Transmontane Freshwater Marsh	305.8	0.1
61110	North Coast Black Cottonwood Riparian Forest	11.9	<0.1
61130	Red Alder Riparian Forest	20.3	<0.1
61210	Central Coast Cottonwood-Sycamore Riparian Forest	77.6	<0.1
61220	Central Coast Live Oak Riparian Forest	29.2	<0.1
61230	Central Coast Arroyo Willow Riparian Forest	42.5	<0.1
61310	Southern Coast Live Oak Riparian Forest	26	<0.1
61320	Southern Arroyo Willow Riparian Forest	37.7	<0.1
61330	Southern Cottonwood-Willow Riparian Forest	59.9	<0.1
61410	Great Valley Cottonwood Riparian Forest	330.5	0.1
61420	Great Valley Mixed Riparian Forest	73.3	<0.1
61430	Great Valley Valley Oak Riparian Forest	91.6	<0.1
61510	White Alder Riparian Forest	27.5	<0.1
61520	Aspen Riparian Forest	59.4	<0.1
61530	Montane Black Cottonwood Riparian Forest	25.8	<0.1
61610	Modoc-Great Basin Cottonwood-Willow Riparian Forest	80.3	<0.1
61700	Mojave Riparian Forest	58.8	<0.1
61810	Sonoran Cottonwood-Willow Riparian Forest	2.7	<0.1

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (Km^2)	Percent of State
61820	Mesquite Bosque	273.9	0.1
62100	Sycamore Alluvial Woodland	11.3	<0.1
62200	Desert Dry Wash Woodland	3,003.70	0.7
62400	Southern Sycamore-Alder Riparian Woodland	18.1	<0.1
63100	North Coast Riparian Scrub	99.3	<0.1
63200	Central Coast Riparian Scrub	2.1	<0.1
63310	Mule Fat Scrub	74.7	<0.1
63320	Southern Willow Scrub	1.6	<0.1
63330	Southern Alluvial Fan Scrub *	13.2	<0.1
63410	Great Valley Willow Scrub	18.9	<0.1
63420	Great Valley Mesquite Scrub	22.6	<0.1
63500	Montane Riparian Scrub	119.9	<0.1
63600	Modoc-Great Basin Riparian Scrub	84.6	<0.1
63700	Mojave Desert Wash Scrub	2	<0.1
63810	Tamarisk Scrub	105.1	<0.1
63820	Arrowweed Scrub	13.4	<0.1
71110	Oregon Oak Woodland	2,436.90	0.6
71120	Black Oak Woodland	1,641.40	0.4
71130	Valley Oak Woodland	922	0.2
71140	Blue Oak Woodland	10,451.80	2.6
71150	Interior Live Oak Woodland	1,731.60	0.4
71160	Coast Live Oak Woodland	1,172.20	0.3
71170	Alvord Oak Woodland	339.7	0.1
71182	Dense Engelmann Oak Woodland	234.8	0.1
71210	California Walnut Woodland	58.5	<0.1
71310	Open Foothill Pine Woodland	1,495.80	0.4
71321	Serpentine Foothill Pine-Chaparral Woodland	836.7	0.2
71322	Non-Serpentine Foothill Pine Woodland	787.8	0.2
71410	Foothill Pine-Oak Woodland	10,180.50	2.5
71420	Mixed North Slope Cismontane Woodland	1,005.30	0.2
71430	Juniper-Oak Cismontane Woodland	301.8	0.1
71600	Oak-Piñon Woodland *	135.8	<0.1
72100	Great Basin Woodlands	9,157.80	2.2
72200	Mojavean Piñon and Juniper Woodlands	4,035.60	1
72300	Peninsular Piñon and Juniper Woodlands	480	0.1
72400	Cismontane Juniper Woodland and Scrub	31.2	<0.1

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (km2)	Percent of State
73000	Joshua Tree Woodland	123.3	<0.1
81100	Mixed Evergreen Forest	4,646.50	1.1
81200	California Bay Forest	13.2	<0.1
81310	Coast Live Oak Forest	2,193.70	0.5
81320	Canyon Live Oak Forest	1,736.20	0.4
81330	Interior Live Oak Forest	2,708.90	0.7
81340	Black Oak Forest	5,614.90	1.4
81400	Tan-Oak Forest	1,824.70	0.4
81B00	Aspen Forest	187.8	<0.1
82100	Sitka Spruce-Grand Fir Forest	339.3	0.1
82310	Alluvial Redwood Forest	742	0.2
82320	Upland Redwood Forest	5,407.60	1.3
82410	Coastal Douglas-Fir-Western Hemlock Forest	32.4	<0.1
82420	Upland Douglas-Fir Forest	344.3	0.1
82500	Port Orford Cedar Forest	5.5	<0.1
83110	Beach Pine Forest	14	<0.1
83120	Bishop Pine Forest	180.6	<0.1
83130	Monterey Pine Forest	39.2	<0.1
83161	Mendocino Pygmy Cypress Forest	10.5	<0.1
83210	Knobcone Pine Forest	341.6	3.8
83220	Northern Interior Cypress Forest	182.9	<0.1
83330	Southern Interior Cypress Forest	20.5	<0.1
84110	Coast Range Mixed Coniferous Forest	13,539.20	3.3
84120	Santa Lucia Fir Forest	8.4	<0.1
84130	Coast Range Ponderosa Pine Forest	468.9	0.1
84140	Coulter Pine Forest	405.2	0.1
84150	Bigcone Spruce-Canyon Oak Forest	341.6	0.1
84160	Ultramafic White Pine Forest	22.2	<0.1
84171	Northern Ultramafic Jeffrey Pine Forest	496.3	0.1
84180	Ultramafic Mixed Coniferous Forest	262.2	0.1
84210	Westside Ponderosa Pine Forest	9,750.30	2.4
84220	Eastside Ponderosa Pine Forest	6,382.70	1.6
84230	Sierran Mixed Coniferous Forest	15,637.10	3.8
84240	Sierran White Fir Forest	1,055.80	0.3
84250	Big Tree Forest	171.3	<0.1
84260	Modoc White Fir Forest *	942.7	0.2

Community Code	Land-Cover Type/Natural Community (Holland 1986)	Total State Mapped Distribution (km^2)	Percent of State
85100	Jeffrey Pine Forest	3,257.70	0.8
85120	Red Fir-Western White Pine Forest *	1,598.80	0.4
85210	Jeffrey Pine-Fir Forest	4,308.70	1.1
85310	Red Fir Forest	4,475.70	1.1
85320	Southern California White Fir Forest	38.1	<0.1
85410	Siskiyou Enriched Coniferous Forest	245.1	0.1
85420	Salmon-Scott Enriched Coniferous Forest	1,047.10	0.3
86100	Lodgepole Pine Forest	2,572.30	0.6
86210	Whitebark Pine-Mountain Hemlock Forest	429.4	0.1
86220	Whitebark Pine-Lodgepole Pine Forest	588.2	0.1
86300	Foxtail Pine Forest	238	0.1
86400	Bristlecone Pine Forest	99.1	<0.1
86500	Southern California Subalpine Forest	52.4	<0.1
86600	Whitebark Pine Forest	233.3	0.1
86700	Limber Pine Forest	21	<0.1
91110	Klamath-Cascade Fell-field	59	<0.1
91120	Sierra Nevada Fell-field	122.5	<0.1
94000	Alpine Dwarf Scrub	611	0.1
11100	Urban or Built-Up Land	18,352.50	4.5
11200-11213	Agricultural types	52,426.30	12.9
11300	Eucalyptus Groves (exotic)	34.8	<0.1
11401-11402	Conifer Plantations	1,335.80	0.3
11510	Streams and Canals	352.8	0.1
11520	Permanently-flooded Lacustrine Habitat	4,059.30	1
11521	Intermittently-flooded Lacustrine Habitat	223.1	0.1
11540	Bays and Estuaries	221.1	0.1
11710	Dry Salt Flat	866.1	0.2
11720	Beaches and Coastal Dunes	73.1	<0.1
11730	Sandy Area Other than Beaches	171.3	<0.1

Community Code	Land Cover Types Other Than Natural Communities	Total State Mapped Distribution (km^2)	Percent of State
11740	Bare Exposed Rock	5,875.20	1.4
11750	Strip Mines, Quarries and Gravel Pits	247.4	0.1
11760	Transitional Bare Areas	101.3	<0.1
11770	Mixed Barren Land	651.1	0.2
11780	Mud Flats	154.5	<0.1
Statewide Total - All Lands		**408,636**	**100**

* Community type developed by California Gap Analysis Project.

Appendix 6
Representation Analysis for California Natural Communities
Adapted from California Gap Analysis Project

Community Code	Community Name (Holland 1986)	<10% Status 1-2	<20% Status 1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
21210	Northern Foredunes		14.6			68.7	S2.1	
21310	Northern Dune Scrub		11.3			87.6	S1.2	
21320	Central Dune Scrub			27.6		12.5	S2.2	E
22000	Desert Dunes			44.9		14.7	S2.2/3.2	
23300	Monvero Residual Dunes			31		68.9	S1.2	E
31100	Northern Coastal Bluff Scrub				100	0	S2.2	E
31200	Southern Coastal Bluff Scrub		13.9			85.6	S1.1	E
32100	Northern (Franciscan) Coastal Scrub			23.2		72.3	S4/3.2/2.3	E
32200	Central (Lucian) Coastal Scrub	7.6				66.7	S3.3	E
32300	Venturan Coastal Sage Scrub	8.7				78.2	S3.1	L,E
32500	Diegan Coastal Sage Scrub	5.8				61.3	S3.1	L
32600	Diablan Sage Scrub	2.4				84.8	S3.2	E
32700	Riversidian Sage Scrub	7.3				69.3	S1.1/3.1	L,E
33100	Sonoran Creosote Bush Scrub			33.5		15.3	S4	E
33200	Sonoran Desert Mixed Scrub			48		16.1	S3.2	E
34100	Mojave Creosote Bush Scrub			31.8		20.1	S4	E
34210	Mojave Mixed Woody Scrub				58.2	11.4	S3.2	E
34220	Mojave Mixed Steppe				78.1	20.5	S2.2	E
34240	Mojave Mixed Woody and Succulent Scrub				63	14.4	S3.2	E
34300	Blackbush Scrub				56.9	8.8	S3.2	
35100	Great Basin Mixed Scrub	7.9				19.9	S4	

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
35110	*Salvia dorri/Chamaebatiaria* Scrub *				91.7	0.8	--	E
35210	Big Sagebrush Scrub			20.5		22.7	S4	
35211	Low Sagebrush Scrub *	3				26.6	--	
35212	Silver Sagebrush Scrub *	9.6				42	--	
35213	Black Sagebrush Scrub *				96.7	0	--	
35220	Subalpine Sagebrush Scrub		17.8			15.4	S3.2	
35400	Rabbitbrush Scrub	0.7				46.2	S5	
35500	*Cercocarpus ledifolius* Woodland *		14.9			8.4	--	
36110	Desert Saltbush Scrub		17			36.9	S3.2	
36120	Desert Sink Scrub			40.4		7	S3.1	
36130	Desert Greasewood Scrub	8.4				35.6	S3.2	
36140	Shadscale Scrub				61.5	2.9	S3.2	
36150	Desert Holly Scrub *				67	1.1	--	
36210	Valley Sink Scrub		11.2			88.7	S1.1	L,E
36220	Valley Saltbush Scrub		12.7			70.8	S2.1	L,E
36320	Interior Coast Range Saltbush Scrub		17.6			73.5	S2.1	E
37110	Northern Mixed Chaparral	7.9				41.3	S4	E
37120	Southern Mixed Chaparral	3.8				61	S3.2/3.3	
37200	Chamise Chaparral		13.4			55.1	S4	E
37300	Red Shank Chaparral		10.6			42.1	S3.2	
37400	Semi-Desert Chaparral		18.5			39.8	S3.2	E
37510	Mixed Montane Chaparral			26.4		21.7	S4	
37520	Montane Manzanita Chaparral		10.8			42.1	S4	
37530	Montane Ceanothus Chaparral		13.4			34.3	S4/3.3	
37541	Shin Oak Brush		15.3			36.2	S3.3	E
Community Code	**Community Name (Holland 1986)**	**<10% Status1-2**	**<20% Status1-2**	**<50% Status 1-2**	**>50% Status 1-2**	**% Private**	**NHD Rank****	**Notes+**
37542	Huckleberry Oak Chaparral			37.9		20.9	S3.3	E

37550	Bush Chinquapin Chaparral		20			24	S3.3	E
37610	Mixed Serpentine Chaparral	1				64.3	S2.1	E
37620	Leather Oak Chaparral		18.2			59.8	S3.2	E
37810	Buck Brush Chaparral		17.5			44.9	S4	E
37820	Blue Brush Chaparral		13.4			75	S4	E
37830	*Ceanothus crassifolius* Chaparral		15.5			36.3	S3.2	E
37840	*Ceanothus megacarpus* Chaparral		18.5			56.4	S3.2	E
37900	Scrub Oak Chaparral			23.4		24.2	S3.3	E
37A00	Interior Live Oak Chaparral			26.6		24.6	S3.3	E
37B00	Upper Sonoran Manzanita Chaparral			20.1		25	S4	E
37C10	Northern Maritime Chaparral		18.3			43.3	S1.2	E
37C20	Central Maritime Chaparral		13.5			38.8	S2.2	E
37D00	Ione Chaparral	0				96.2	S1.1	E
3.70E+01	Mesic North Slope Chaparral			29.4		27.2	S3.3	E
37G00	Coastal Sage-Chaparral Scrub	5.1				78	S3.2	E
39000	Upper Sonoran Subshrub Scrub			25.8		57.8	S3.2	E
41000	Coastal Prairie	10				86.7	S2.1	
42110	Valley Needlegrass Grassland			21.7		77.9	S3.1	L,E,X
42120	Valley Sacaton Grassland				64.7	35.3	S1.1	L,E,X
42160	Desert Native Grassland *	0.5				17.6	--	
42200	Non-Native Grassland	4.8				87.1	S4	L,X
42300	Wildflower Field	0				68.5	S2.2	
43000	Great Basin Grassland		11.5			39.1	S1.1	X
44110	Northern Hardpan Vernal Pool	0				100	S3.1	E
44120	Northern Claypan Vernal Pool			21.3		78.7	S1.1	E

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
44131	Northern Basalt Flow Vernal Pool	0				3.2	S2.2	E
45100	Montane Meadow			26.8		43.4	S3.2	
45200	Subalpine or Alpine Meadow			31.6		25	S3.2	
45310	Alkali Meadow	9.8				12	S2.1	
45500	Great Basin Wet Meadow *		10.4			42.1	--	
46000	Alkali Playa			20.1		15.3	S3.2	
47000	Pavement Plain	1				33.2	S1.1	E
51110	Sphagnum Bog				92.2	0	S1.2	
52110	Northern Coastal Salt Marsh			44.5		48.8	S3.2	L
52120	Southern Coastal Salt Marsh			33.7		49	S2.1	L
52200	Coastal Brackish Marsh		15.7			77.9	S2.1	L
52310	Cismontane Alkali Marsh	4				95.7	S1.1	L,E
52320	Transmontane Alkali Marsh			27.3		45.2	S2.1	
52410	Coastal and Valley Freshwater Marsh			38.5		59.3	S2.1	L
52420	Transmontane Freshwater Marsh			35.3		47.8	S2.2	
61110	North Coast Black Cottonwood Riparian Forest	1.2				59.1	S1.1	
61130	Red Alder Riparian Forest		15.8			83.2	S2.2	
61210	Central Coast Cottonwood-Sycamore Riparian Forest	8.9				68.9	S3.2	E
61220	Central Coast Live Oak Riparian Forest		15.4			78.9	S3.2	E
61230	Central Coast Arroyo Willow Riparian Forest	1.8				53.3	S3.2	E
61310	Southern Coast Live Oak Riparian Forest		16.2			38.1	S4	E
61320	Southern Arroyo Willow Riparian Forest	7.6				55.6	S2.1	E
61330	Southern Cottonwood-Willow Riparian Forest	7.4				47.8	S3.2	E
61410	Great Valley Cottonwood Riparian Forest		19			78.5	S2.1	L,E
61420	Great Valley Mixed Riparian Forest		15.6			77.3	S2.2	L,E

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
61430	Great Valley Valley Oak Riparian Forest	4.5				93.5	S1.1	L,E
61510	White Alder Riparian Forest		17.7			71.3	S4	
61520	Aspen Riparian Forest	7.4				15.8	S3.2	
61530	Montane Black Cottonwood Riparian Forest		18.1			61.1	S3.2	
61610	Modoc-Great Basin Cottonwood-Willow Riparian Forest	2				48.6	S2.1	
61700	Mojave Riparian Forest		15.6			48.9	S1.1	E
61810	Sonoran Cottonwood-Willow Riparian Forest	0.1				99.9	S1.1	L,E
61820	Mesquite Bosque				58.6	25.3	S2.1	L
62100	Sycamore Alluvial Woodland	5.1				59.7	S1.1	E
62200	Desert Dry Wash Woodland			20.9		18.4	S3.2	E
62400	Southern Sycamore-Alder Riparian Woodland	6.6				65.7	S4	E
63100	North Coast Riparian Scrub	3.9				87.1	S3.2	E
63200	Central Coast Riparian Scrub	3.4				95.4	S3.2	E
63310	Mule Fat Scrub	7.2				75	S4	
63320	Southern Willow Scrub	0				88.3	S2.1	L
63330	Southern Alluvial Fan Scrub *	0				97.7	NR	E
63410	Great Valley Willow Scrub	1				97.6	S3.2	E
63420	Great Valley Mesquite Scrub	0.3				99.7	S1.1	L,E
63500	Montane Riparian Scrub			24.1		49.8	S4	L
63600	Modoc-Great Basin Riparian Scrub		15.1			31.5	S2.1	
63700	Mojave Desert Wash Scrub	0				55.4	S3.2	E
63810	Tamarisk Scrub		11.8			60.4	S4	X
63820	Arrowweed Scrub	0				92.6	S3.3	
71110	Oregon Oak Woodland	2.5				64.2	S3.3	
71120	Black Oak Woodland	4.9				57.9	S3.2	E

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
71130	Valley Oak Woodland	1.3				94.4	S2.1	E
71140	Blue Oak Woodland	3.8				83.7	S3.2	E
71150	Interior Live Oak Woodland	4.1				71.1	S3.2	E
71160	Coast Live Oak Woodland	4				87.4	S4	E
71170	Alvord Oak Woodland	1.3				87.6	S2.2	E
71182	Dense Engelmann Oak Woodland	3.5				66.5	S2.1	E
71210	California Walnut Woodland	2.9				88.4	S2.1	E
71310	Open Foothill Pine Woodland		10.8			67.9	S4	E
71321	Serpentine Foothill Pine-Chaparral Woodland	2.8				56	S3.2	E
71322	Non-Serpentine Foothill Pine Woodland	8.4				59.5	S4	E
71410	Foothill Pine-Oak Woodland	3.2				83	S4	E
71420	Mixed North Slope Cismontane Woodland	1.7				78	S3.2	
71430	Juniper-Oak Cismontane Woodland	0.8				83.1	S3.2	E
71600	Oak-Piñon Woodland *				64.5	8.2	not ranked	E
72100	Great Basin Woodlands		11			24.6	S3.2/4	
72200	Mojavean Piñon and Juniper Woodlands			35.5		23.6	S3.2/4	E
72300	Peninsular Piñon and Juniper Woodlands				73.2	15.2	S3.2	E
72400	Cismontane Juniper Woodland and Scrub	4.5				79.3	S2.1	E
73000	Joshua Tree Woodland				86.9	5.8	S3.2	E
81100	Mixed Evergreen Forest		14.3			64.7	S4	
81200	California Bay Forest	4.6				75	S3.2	E
81310	Coast Live Oak Forest	4.9				84.8	S4	E
81320	Canyon Live Oak Forest			21.8		33.3	S4	E
81330	Interior Live Oak Forest	3.4				79.7	S4	E
81340	Black Oak Forest	7.9				45.7	S4	E

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
81400	Tan-Oak Forest	7.1				55.8	S4	E
81B00	Aspen Forest		20			5.8	S3.2	
82100	Sitka Spruce-Grand Fir Forest			22		78	S1.1	
82310	Alluvial Redwood Forest	4.9				87	not ranked	E
82320	Upland Redwood Forest		12.6			82.5	S2.3	E
82410	Coastal Douglas-Fir-Western Hemlock Forest	8.4				62.2	S2.1	
82420	Upland Douglas-Fir Forest		17.6			67.4	S3.1	
82500	Port Orford Cedar Forest				88.2	1.1	S2.1	
83110	Beach Pine Forest			32		68	S2.1	
83120	Bishop Pine Forest			20.5		74.7	S1.1-2.2	E
83130	Monterey Pine Forest	7.5				87.9	S1.1	E
83161	Mendocino Pygmy Cypress Forest		10.5			78.9	S2.1	E
83210	Knobcone Pine Forest	3.8				35.7	S4	E
83220	Northern Interior Cypress Forest	0.7				87.2	S2.2	E
83330	Southern Interior Cypress Forest	6.7				22.5	S2.1	E
84110	Coast Range Mixed Coniferous Forest		14.7			35.3	S4	
84120	Santa Lucia Fir Forest				100	0	S2.2	E
84130	Coast Range Ponderosa Pine Forest			22.8		45.5	S3.2/1.1	
84140	Coulter Pine Forest			20.5		30.4	S3.2	E
84150	Bigcone Spruce-Canyon Oak Forest			46.5		6.8	S3.2	E
84160	Ultramafic White Pine Forest				51.5	24.1	S3.2	E
84171	Northern Ultramafic Jeffrey Pine Forest			24.2		21.7	S3.2	E
84180	Ultramafic Mixed Coniferous Forest		15.9			10.2	S4	E
84210	Westside Ponderosa Pine Forest		13.8			39	S2.1	E
84220	Eastside Ponderosa Pine Forest	2.3				30.6	S2.1	
84230	Sierran Mixed Coniferous Forest	8.7				42	S4	E

Community Code	Community Name (Holland 1986)	<10% Status1-2	<20% Status1-2	<50% Status 1-2	>50% Status 1-2	% Private	NHD Rank**	Notes+
84240	Sierran White Fir Forest			22.9		25.2	S4	E
84250	Big Tree Forest			37		5.3	S3.2	E
84260	Modoc White Fir Forest *	9.1				35.3	--	E
85100	Jeffrey Pine Forest			22.1		11.1	S4	E
85120	Red Fir-Western White Pine Forest *				57.3	6.5	--	E
85210	Jeffrey Pine-Fir Forest			29.4		12.3	S4	E
85310	Red Fir Forest			47.5		10.1	S4	E
85320	Southern California White Fir Forest			34.8		12.6	S4	E
85410	Siskiyou Enriched Coniferous Forest			44.3		7.2	S1.2	E
85420	Salmon-Scott Enriched Coniferous Forest				55.1	13.4	S1.2	E
86100	Lodgepole Pine Forest				69.8	4.6	S4	
86210	Whitebark Pine-Mountain Hemlock Forest				82.7	4.6	S4	
86220	Whitebark Pine-Lodgepole Pine Forest				68	1.1	S4	
86300	Foxtail Pine Forest				97.7	1.1	S3.3	E
86400	Bristlecone Pine Forest				52.3	0	S2.3	
86500	Southern California Subalpine Forest				92.3	0	S3.3	E
86600	Whitebark Pine Forest				60.7	0.5	S4	
86700	Limber Pine Forest				81.2	0	S2.3	
91110	Klamath-Cascade Fell-field				94.6	1	S4	E
91120	Sierra Nevada Fell-field				55.2	0.5	S4	E
94000	Alpine Dwarf Scrub				63	0.1	S4	

* Community description developed by California Gap Analysis Project

** NHD ranks are described in section 3.1.4 of the report

+ Notes column symbols: E = largely endemic to California; L = large historic losses; X = subject to invasion by exotic plants

Appendix 7
Extents of Bay Area Natural Communities and Land-Cover Types
Based on California Gap Analysis Project Land Cover Layer

Community Code	Natural Community/Land Cover Type (Holland 1986)	Total Bay Area Mapped Distribution (km^2)	Percent of Bay Area
21320	Central Dune Scrub	5.6	0.03
31100	Northern Coastal Bluff Scrub	39.1	0.22
32100	Northern (Franciscan) Coastal Scrub	439.0	2.41
32200	Central (Lucian) Coastal Scrub	98.2	0.54
32300	Venturan Coastal Sage Scrub	1.0	0.01
32600	Diablan Sage Scrub	82.0	0.45
37110	Northern Mixed Chaparral	18.5	0.10
37200	Chamise Chaparral	318.5	1.75
37400	Semi-Desert Chaparral	1.5	0.01
37510	Mixed Montane Chaparral	2.5	0.01
37520	Montane Manzanita Chaparral	1.0	0.01
37530	Montane Ceanothus Chaparral	2.1	0.01
37610	Mixed Serpentine Chaparral	3.5	0.02
37620	Leather Oak Chaparral	5.6	0.03
37810	Buck Brush Chaparral	348.0	1.91
37820	Blue Brush Chaparral	17.3	0.10
37900	Scrub Oak Chaparral	22.3	0.12
37A00	Interior Live Oak Chaparral	12.9	0.07
37B00	Upper Sonoran Manzanita Chaparral	23.0	0.13
37C20	Central Maritime Chaparral	13.2	0.07
37E00	Mesic North Slope Chaparral	49.7	0.27
37G00	Coastal Sage-Chaparral Scrub	9.1	0.05
41000	Coastal Prairie	696.4	3.83
42110	Valley Needlegrass Grassland	3.5	0.02
42200	Non-native Grassland	2272.5	12.48
44120	Northern Claypan Vernal Pool	1.6	0.01
52110	Northern Coastal Salt Marsh	71.9	0.40
52200	Coastal Brackish Marsh	246.6	1.35
52410	Coastal and Valley Freshwater Marsh	13.9	0.08
61210	Central Coast Cottonwood-Sycamore Riparian Forest	0.2	<0.01
61220	Central Coast Live Oak Riparian Forest	5.8	0.03
61230	Central Coast Arroyo Willow Riparian Forest	2.1	0.01

Community Code	Natural Community/Land Cover Type (Holland 1986)	Total Bay Area Mapped Distribution (km^2)	Percent of Bay Area
61410	Great Valley Cottonwood Riparian Forest	4.0	0.02
63100	North Coast Riparian Scrub	15.3	0.08
63810	Tamarisk Scrub	0.5	<0.01
71110	Oregon Oak Woodland	187.7	1.03
71120	Black Oak Woodland	140.4	0.77
71130	Valley Oak Woodland	24.2	0.13
71140	Blue Oak Woodland	628.3	3.45
71150	Interior Live Oak Woodland	91.3	0.50
71160	Coast Live Oak Woodland	403.6	2.22
71310	Open Foothill Pine Woodland	26.5	0.15
71321	Serpentine Foothill Pine-Chaparral Woodland	42.3	0.23
71322	Non-Serpentine Foothill Pine Woodland	108.0	0.59
71410	Foothill Pine-Oak Woodland	735.2	4.04
71420	Mixed North Slope Cismontane Woodland	287.0	1.58
81100	Mixed Evergreen Forest	1471.1	8.08
81200	California Bay Forest	3.0	0.02
81310	Coast Live Oak Forest	883.4	4.85
81320	Canyon Live Oak Forest	113.1	0.62
81330	Interior Live Oak Forest	122.3	0.67
81340	Black Oak Forest	282.8	1.55
81400	Tan-Oak Forest	51.4	0.28
82310	Alluvial Redwood Forest	31.6	0.17
82320	Upland Redwood Forest	786.0	4.32
82420	Upland Douglas-Fir Forest	157.3	0.86
83120	Bishop Pine Forest	50.9	0.28
83130	Monterey Pine Forest	3.2	0.02
83161	Mendocino Pygmy Cypress Forest	0.7	<0.01
83210	Knobcone Pine Forest	37.7	0.21
83220	Northern Interior Cypress Forest	1.9	0.01
84110	Coast Range Mixed Coniferous Forest	219.8	1.21
84130	Coast Range Ponderosa Pine Forest	8.6	0.05
84140	Coulter Pine Forest	11.3	0.06

Community Code	Land Cover Types Other Than Natural Communities	Total Bay Area Mapped Distribution (km^2)	Percent of Bay Area
11100	Urban or built up land	3544.8	19.47
11200	Agriculture	1405.4	7.72
11201	Agriculture	604.8	3.32
11206	Agriculture	186.7	1.03
11210	Agriculture	258.0	1.42
11212	Agriculture	16.1	0.09
11213	Agriculture	93.0	0.51
11300	Eucalyptus Groves	4.4	0.02
11401	Conifer plantations	1.2	<0.01
11510	Streams and Canals	49.8	0.27
11520	Permanently Flooded Lacustrine Habitat	161.6	0.89
11540	Bays and Estuaries	52.3	0.29
11720	Beaches and Coastal Dunes	7.8	0.04
11730	Sandy Area other than Beaches	4.6	0.03
11740	Bare Exposed Rock	0.7	<0.01
11750	Strip Mines, Quarries, Gravel Pits	40.2	0.22
11770	Mixed Barren Land	16.5	0.09

Appendix 8
Representation Analysis for Bay Area Natural Communities

Community Code	Community Name (Holland 1986)	Protected Area in Bay Area (km^2)	Percent of Bay Area Extent Protected	<10% Status 1-2	<20% Status 1-2	<50% Status 1-2	>50% Status 1-2	NHD Rarity/ Threat Ranks	% Protected Statewide
21320	Central Dune Scrub	1.9	33.5			33.5		S2.2	27.6
31100	Northern Coastal Bluff Scrub	37.1	94.9				94.9	S2.2	100.0
32100	Northern (Franciscan) Coastal Scrub	168.9	38.5			38.5		S4/3.2/2.	23.2
32200	Central (Lucian) Coastal Scrub	41.2	42.0			42.0		S3.3	7.6
32300	Venturan Coastal Sage Scrub	0.1	8.8	8.8				S3.1	8.7
32600	Diablan Sage Scrub	9.5	11.6		11.6			S3.3	2.4
37110	Northern Mixed Chaparral	0.2	1.1	1.1				S4	7.9
37200	Chamise Chaparral	120.2	37.7			37.7		S4	13.4
37400	Semi-Desert Chaparral	0.7	47.0			47.0		S3.2	18.5
37510	Mixed Montane Chaparral	0.0	0.0	0.0				S4	26.4
37520	Montane Manzanita Chaparral	0.7	64.1				64.1	S4	10.8
37530	Montane Ceanothus Chaparral	0.0	0.0	0.0					13.4
37610	Mixed Serpentine Chaparral	0.0	0.0	0.0				S2.1	1.0
37620	Leather Oak Chaparral	0.0	0.0	0.0				S3.2	18.2
37810	Buck Brush Chaparral	62.3	17.9		17.9			S4	17.5
37820	Blue Brush Chaparral	4.0	23.3			23.3		S4	13.4
37900	Scrub Oak Chaparral	3.9	17.7		17.7			S3.3	23.4
37A00	Interior Live Oak Chaparral	5.4	42.0			42.0		S3.3	26.6
37B00	Upper Sonoran Manzanita Chaparral	11.7	50.9				50.9	S4	20.1
37C20	Central Maritime Chaparral	9.7	73.6				73.6	S2.2	13.5

Community Code	Community Name (Holland 1986)	Protected Area in Bay Area (km^2)	Percent of Bay Area Protected	<10% Status 1-2	<20% Status 1-2	<50% Status 1-2	>50% Status 1-2	NHD Rarity/ Threat Ranks	Percent Protected Statewide
37E00	Mesic North Slope Chaparral	20.3	40.9			40.9		S3.3	29.4
37G00	Coastal Sage-Chaparral Scrub	5.0	55.4				55.4	S3.2	5.1
41000	Coastal Prairie	123.2	17.7		17.7			S2.1	10.0
42110	Valley Needlegrass Grassland	1.4	40.9			40.9		S3.1	21.7
42200	Non-native Grassland	413.1	18.2		18.2			S4	4.8
44120	Northern Claypan Vernal Pool	0.8	49.9			49.9		S1.1	21.3
52110	Northern Coastal Salt Marsh	45.5	63.2				63.2	S3.2	44.5
52200	Coastal Brackish Marsh	46.1	18.7		18.7			S2.1	15.7
52410	Coastal and Valley Freshwater Marsh	2.9	21.1			21.1		S2.1	38.5
61210	Central Coast Cottonwood-Sycamore Riparian Forest	0.0	0.0	0.0				S3.2	8.9
61220	Central Coast Live Oak Riparian Forest	3.7	63.0				63.0	S3.2	15.4
61230	Central Coast Arroyo Willow Riparian Forest	1.6	75.1				75.1	S3.2	1.8
61410	Great Valley Cottonwood Riparian Forest	0.0	0.0	0.0				S2.1	19.0
63100	North Coast Riparian Scrub	0.0	0.0	0.0				S3.2	3.9
63810	Tamarisk Scrub	0.0	0.0	0.0				S4	11.8
71110	Oregon Oak Woodland	39.8	21.2			21.2		S3.3	2.5
71120	Black Oak Woodland	35.6	25.3			25.3		S3.2	4.9
71130	Valley Oak Woodland	4.5	18.5		18.5			S2.1	1.3
71140	Blue Oak Woodland	122.2	19.5		19.5			S3.2	3.8
71150	Interior Live Oak Woodland	21.1	23.1			23.1		S3.2	4.1
71160	Coast Live Oak Woodland	79.9	19.8		19.8			S4	4.0
71310	Open Foothill Pine Woodland	2.4	9.0	9.0				S4	10.8

Community Code	Community Name (Holland 1986)	Protected Area in Bay Area (km^2)	Percent of Bay Area Protected	<10% Status 1-2	<20% Status 1-2	<50% Status 1-2	>50% Status 1-2	NHD Rarity/ Threat Ranks	Percent Protected Statewide
71321	Serpentine Foothill Pine-Chaparral Woodland	0.7	1.5	1.5				S3.2	2.8
71322	Non-Serpentine Foothill Pine Woodland	8.0	7.4	7.4				S4	8.4
71410	Foothill Pine-Oak Woodland	134.2	18.3		18.3			S4	3.2
71420	Mixed North Slope Cismontane Woodland	11.7	4.1	4.1				S3.2	1.7
81100	Mixed Evergreen Forest	395.1	26.9			26.9		S4	14.3
81200	California Bay Forest	1.2	39.3			39.3		S3.2	4.6
81310	Coast Live Oak Forest	109.6	12.4		12.4			S4	4.9
81320	Canyon Live Oak Forest	2.5	2.2	2.2				S4	21.8
81330	Interior Live Oak Forest	15.6	12.8		12.8			S4	3.4
81340	Black Oak Forest	18.6	6.6	6.6				S4	7.9
81400	Tan-Oak Forest	1.6	3.2	3.2				S4	7.1
82310	Alluvial Redwood Forest	0.0	0.0	0.0				NR	4.9
82320	Upland Redwood Forest	175.7	22.4			22.4		S2.3	12.6
82420	Upland Douglas-Fir Forest	47.4	30.1			30.1		S3.1	17.6
83120	Bishop Pine Forest	29.2	57.4				57.4	S2.2/S1.1	20.5
83130	Monterey Pine Forest	0.0	0.0	0.0				S1.1	7.5
83161	Mendocino Pygmy Cypress Forest	0.0	0.0	0.0				S2.1	10.5
83210	Knobcone Pine Forest	8.8	23.4			23.4		S4	3.8
83220	Northern Interior Cypress Forest	0.0	0.0	0.0				S2.2	0.7
84110	Coast Range Mixed Coniferous Forest	24.1	11.0		11.0			S4	14.7
84130	Coast Range Ponderosa Pine Forest	1.1	12.6		12.6				22.8
84140	Coulter Pine Forest	0.1	1.3	1.3				S3.2	20.5

Appendix 9
Greenbelt Mapping and Assessment Program
Greenbelt Alliance

Established in 1988, the Greenbelt Mapping and Assessment Program (GMAP) is a survey of all Bay Area open lands, highlighting those within reach of development pressures and not firmly protected as open space (e.g. as privately owned farmlands or publicly held parks and watersheds). It is a "snapshot" of current development pressures, showing likely directions of suburban, ranchette, and related development. Using GreenInfo Network's advanced Geographic Information Systems, we have illustrated these land use patterns through striking maps of the entire Bay Area. It can also give a detailed numerical breakdown of which lands are already urbanized, which are unlikely to be developed, and which may be developed, and over what timeline. With these qualities, GMAP has become a valuable planning and observation tool for Bay Area citizens, planners, and public officials. It gives residents a sense of the Bay Area's future — and perhaps more important — how they can shape the region's destiny. This is especially the case now that Greenbelt Alliance is conducting regular updates of GMAP. With this fourth update of GMAP's findings, we continue to assess how changes in market dynamics and land use planning have brought about changes in local development trends. Through GMAP's prism, we can see how counties like Marin have protected their share of the Bay Area's Greenbelt and directed new development toward existing urban centers, while counties like Contra Costa have permitted pressures for development to spill out across their landscape.

At Risk: The Bay Area's Greenbelt describes these land use lessons, as well as GMAP's process, the program's earlier findings, and GMAP's new window on development trends at regional and county levels.

Classifying Lands At Risk The Greenbelt Mapping and Assessment Program is a land classification system that separates the Bay Area's 4.5 million acres into two broad categories: urbanized and open lands (the latter making up the region's Greenbelt). Urban lands are those developed at a minimum of one unit to the acre. They make up 16.7 percent of the Bay Area's total land area. GMAP divides the remaining 83.3 percent of the region's land into four categories, based on whether or not they are likely to be developed and when they might be developed. The four categories are designated as:

- *High Risk:* Greenbelt lands under imminent threat of development or being taken out of Greenbelt-related uses, such as agriculture. There will be strong pressure to develop these lands in the next decade.
- *Medium Risk:* Greenbelt lands at risk due to partial land use protections or location just beyond high risk lands at the urban fringe. These are likely to be targeted for development in the next 30 years. GMAP treats some ranchette areas, particularly areas split down to 5 acre parcels or less, as "medium risk" lands, recognizing that these lands are no longer likely to be used as productive farmland, while also recognizing that many of these lands are not likely to be urbanized into a higher

density in the near future due to infrastructure constraints and in some counties, strong policies precluding the further subdivision of these properties.

- *Low Risk:* Greenbelt lands that, for a variety of geographic, political or regulatory reasons, are not likely to be threatened in the next 30 years.
- *Secure Greenbelt:* Greenbelt lands not threatened by development, due to their status as public lands (though not all public lands are automatically designated as "Secure Greenbelt"), land trust properties, easements, or private land securely protected by a vote of the people (by referenda or initiatives).

Each Bay Area county's share of the Greenbelt was analyzed and divided among these four at risk categories. Important factors that were used to determine which Greenbelt lands were at risk included:

- *Current settlement patterns* - the location and configuration of current urban areas and the likelihood that new development will occur at the urban fringe;
- *Market dynamics* - where land is being bought and developed — and for what purpose it is being developed;
- *Parcelization* - extent and intensity of land parcelization;
- *Prospective local land use plans* - current county and city general plans and zoning;
- *Pipeline projects* - proposed development projects, including those that may not be reflected in general or specific plans;
- *Public land ownership* and other techniques to keep open lands in greenbelt-related uses - e.g. Williamson Act tax abatement contracts for farmers;
- *Land use regulatory history* of local jurisdictions - planning history of local planning commissions, city councils, Local Agency Formation Commissions, and county boards of supervisors;
- *Infrastructure capacity* - current and projected capacity of existing and planned road, sewer and water systems; and
- *Topography* - buildability of terrain, depending on steepness of slopes and other physical factors such as soil stability.

Using these factors, GMAP's land use analysis reveals that ***High Risk*** lands are typically distinguished by: buildable terrain; location near existing urban areas and along a significant transportation corridor; county or city planning for development (or a local planning process conducive to development); and, in many cases, a highly speculative real estate market.

Medium Risk lands are distinguished by many of the same factors, although they are usually further removed from existing urban areas. Their development may also be contingent on planned infrastructure construction (such as new roads, road widening, and the extension of sewer and water lines). It should be noted here that many lands at high or medium risk of development are threatened by conversion to urban uses (minimum building density of one unit to the acre). However, in some cases, open lands may be at risk of being taken out of Greenbelt-compatible uses, particularly agriculture, through other forms of development. The Bay Area's flat farmlands have all the classic characteristics of high risk Greenbelt lands: adjacent to major urban centers; accessible, buildable terrain; and pockets of extensive parcelization. The principal culprit besides outright suburban development is "ranchettes" — residential units built on lots (usually

one to ten acres in size) that are larger than standard urban and suburban lots but too small for viable farming operations. Ranchettes, which usually carve up agricultural properties, are often the first step toward the intensive suburbanization and urbanization of rural areas (see sidebar on page nine).

Stepping away from lands at risk of development, the two other Greenbelt land categories — ***Secure Greenbelt*** and ***Low Risk*** — are characterized by: public ownership; remote or unbuildable locations (usually slopes in excess of a 15 percent grade, though this is not always a deterrent to construction); and/or strong land use protections (large lot agricultural zoning, designation of agricultural preserves, Greenbelt protection locked in by the voters, and county-wide plans directing new development to existing urban areas). The characteristics making up these four categories were applied on a county-by-county basis, resulting in development scenarios for each county along with its cities. The scenarios, along with data on urbanized lands, were then transferred to large scale maps (at a scale of 1:62,500) and digitized into a computer system (using ARC INFO software) at GreenInfo Network. This digitized data was then used to produce region-wide and county-specific maps and numerical breakdowns of the status of the region's open lands.

Previous GMAP Findings Prior editions of GMAP were released in 1989, 1991, and 1994. These reports found a very large portion of the Greenbelt at risk, although the second and third edition also indicated steady improvements in the Greenbelt's health.

The 1989 edition revealed 870,000 Greenbelt acres at risk. That was reduced to 620,000 acres in 1991, and 570,000 acres in 1994. The steady drop in acreage at risk is largely attributable to major land use changes in Sonoma County (which adopted a stronger land use plan and created a new open space and farm preservation district) and Napa County (which curtailed development pressures with a 30-year measure to maintain countywide protections for agriculture.

Nevertheless, the 1994 edition of GMAP still showed an area equal to nineteen new San Franciscos at risk of development. Major hotspots included Lagoon Valley (in Solano County), Brentwood (in Contra Costa) the Tri-Valley (in Alameda County), Gilroy (in Santa Clara County), and the Mid-State Toll Road in the East Bay.

Unfortunately, while total acreage at risk has declined over the last five years, most of the hotspots highlighted in our 1994 report remain vulnerable to major sprawl development today. One major threat -- the Mid-State Toll Road -- which could haveencouraged more sprawl over 100,000 Greenbelt acres in Contra Costa, Alameda, and Solano counties, appears to have faded. In addition, significant progress was made through the adoption of urban growth boundaries, especially in Sonoma and Santa Clara counties; key land acquisitions like the Bear Creek Redwoods above Los Gatos; and the adoption of protective large minimum parcel size regulations for ranchlands in Alameda County. Copies of the complete 1989, 1991, and 1994 GMAP reports are available from Greenbelt Alliance.

GMAP Changes This edition of At Risk updates GMAP findings through July 1999. It incorporates changes in general plans, project proposals, public land acquisitions, as well as the results of referenda and initiatives considered by Bay Area voters over the last five years. The primary source of information about Secure Greenbelt lands was the Bay Area Open Space Council's database of Public Lands, which was updated through July 1999. Due to technical factors, there are some acreage differences between the 1994 and 1999 risk figures. The total of these differences was less than one percent of the region's land area and did not affect the High and Medium risk categories. Table eight on page 26 shows 1994 acreage adjusted to make it consistent with 1999 and should now be considered the final 1994 figures. As in our 1994 report, GMAP identifies bodies of water -- almost entirely reservoirs -- within public land areas. For accounting purposes, all water body acreage is included in the Secure Greenbelt category. Our GMAP analysis also identifies urban open space within cities, to give a better sense of the "greenspace" systems (or lack thereof) in our communities. Urban open space holdings of ten acres or more are shown. Information on Bay Area urbanization was based on 1996 data obtained from the California State Department of Conservation. Along with the other updates, and the analyses of citizens, public officials, and planners from around the Bay Area, the 2000 edition of At Risk is an important tool for a region grappling with continued growth and change.

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Available at: http://www.fsl.orst.edu/emds/

SITES
Available at: http://www.biogeog.ucsb.edu/projects/tnc/toolbox.html

Worldmap
Available at: http://www.nhm.ac.uk/science/projects/worldmap/worldmap/demo2.htm

Conservation Options and Decision Analysis (CODA)
Available at: http://members.ozemail.com.au/~mbedward/coda/coda.html